PUBLICATION OFFICES:
168–177 POTTER BUILDING, NEW YORK.
Telephone Call: Murray 586. Cable Address: "Electrical," New York.

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VOL. X. NEW YORK, JULY 30, 1887. No. 5.

RUMOR is now active over a settlement of the cable war, and the papers are full of statements on the subject, but their particularity and fullness of detail are an element of suspicion as to their correctness.

BUFFALO proposes to raise $100.000 as a prize to the inventor, from any part of the world, who shall hit upon the best plan or appliance for utilizing the water power of the Niagara River, at or near Buffalo. This is an opportunity of which the electrician should reap all the glory and profit.

IT might almost have been asserted that the protection of buildings is now thoroughly accomplished and that with the fire and burglar alarm systems no harm would come to them. The protection from water overflow, however, is the most recent of the systems to be presented to public notice, and it seems to have a considerable field before it. In private houses where heretofore the overflow vents in wash basins afforded a ready way for the escape of sewer gas, a system of alarm and shutting off of the water is valuable as well for sanitary as for pecuniary reasons.

TELEGRAPHIC developments in the East are important. The Chinese telegraph companies and the Chinese Telegraph Administration have effected an agreement to which the Russian Administration is also a party, by which communication is to be established with the Siberian land lines and a tariff established which is not to compete with the cable companies. The step is not without significance.

THE fight for the underground road in Broadway, or a thoroughfare parallel thereto, goes on, and may go on, from all appearances, for another decade, without definite result. The electrician meanwhile can console himself with the reflection that even the delay is in his favor, every year that passes seeing electricity become more and more competent as the motive power for such a service.

FERDINAND AND ISABELLA have credit for assisting in the discovery of the New World, and now another Isabella of Spain, the Infanta, desires to promote original work, and offers, through the Science and Art Academy of Cadiz, bronze and marble vases for the best treatise on "Electricity as a Propelling Power in Navigation." The theme is an inviting one, and the opportunity excellent for a good treatment of it, though the intrinsic value of the prizes may not be great.

WE publish in this issue the circular just put forth by the local lighting companies interested in the formation of the Mutual Carbon Manufacturing Association. It will be seen that the original idea is held to in spite of the recent rupture of the carbon trust and the drop in the price of carbons, and that the local companies interested are invited to make their views known at the Boston convention on August 9. "Once bitten, twice shy," is a saying that is evidently borne in mind.

IF the wishes of the San Francisco Chamber of Commerce are carried out, this country or some of its capitalists will soon be interested in Pacific cables. That body will petition Congress for support of a cable between the United States and Australasia, on the strong ground that "political and commercial relations of the United States with the Hawaiian Islands, the South Pacific Islands, and Australia, are rapidly increasing." The views of the Chamber are well entitled to consideration, and are enforced by the late revolution at Honolulu.

PROBABLY the early promoters of the District Messenger system had little idea that it would finally obtain such an extension as to include Europe and America at once in the scope of its operations. This week one of the boys started for England on an errand and is to be gone twenty-eight days. There is nothing unusual about the length of time occupied, but there is some novelty in the fact that resort is had to this method of communication across 3,000 miles of ocean. It is safe betting that when the boy comes home he will be invited by at least one of the New York newspapers to give his impressions of Europe.

THE electrical transmission of power is daily assuming more importance. The present outlook is one of great promise, and, as our columns bear witness this week in a very striking manner, the use of electric motors is already, to-day, large and widespread. Motors are to be found by the hundred in all parts of the Union, on both arc and incandescent circuits, doing all kinds of work, and not only is the quantity of power delivered growing, but the motors themselves are becoming larger and larger, until now a motor of 15 or 25 horse-power, or even more, running from a central station circuit excites no special notice.

THE recent bad weather has been remarkable for the frequency of its thunderstorms and for the number of lightning strokes attending such disturbances. We do not remember ever having seen so many reports of damage and fatal stroke. As the data of this character is now being diligently collected, it is not unlikely that some generalization may be reached suggesting new means of protection. One of our contemporaries ventures the opinion that the great number of deaths from lightning among cattle, sheep, etc., may be due to the increased use of wire fencing. Such a point as that, and many others, ought to be determined by systematic inquiry, and the investigation is desirable wherever there is plausibility in the alleged cause of greater danger and more frequent accident.

ALMOST every week we hear of new applications of electricity, and in some cases the work performed is of the most unexpected character. The electric filter described in another column is a fresh example of this ceaseless birth of novelties. Whether the alloys employed in the journal bearings of machinery are attracted by the magnetized iron borings, as alleged, may appear open to doubt, but it may be conceived that impurities of iron in these alloys, or iron particles ground into them, might be the cause of the attraction exerted upon them. We know that in electrical and magnetic instruments it becomes necessary to have the brass mountings as free from iron as possible in order to avoid disturbing action, and hence we might expect an analogous condition in the case mentioned.

INDIA is not a country where one would expect to find a very ready appreciation of new ideas, but it seems that one or two recent improvements are about to have a trial there. Thus it appears that electric train lighting is to be experimented with, and as much of Indian traveling is done at night for the sake of coolness, it is evidently desirable to use incandescent lights. Another new departure is in the adoption of telpherage, about to be undertaken; and the use of electric motors on street railways also seems hopeful. In such a climate as that of India, all three methods have special advantages and ought to be largely and successfully employed.

THE unforeseen results obtained in the operation of the induction system of telegraphing to moving trains recall to mind the discussion which took place at a meeting of the American Institute of Electrical Engineers over a year ago. The question of placing wires, especially those used for telephonic transmission, in metallic conduits, led several speakers to remark that the action between the wire and conduit might cause injurious retardation of the current. While it is true that in the case cited in another column the length of wire on the rail reached fifty miles, which is probably far in excess of what it would reach in cities, the fact of the occurrence of the action is established by actual experience. This point may aid the Board of Electrical Control in determining the best type of conduit for telephone wires, as the subject of iron pipes has been up for discussion before them of late.

THE New York Stock Exchange has been feeling the stress of dull business and the competition of the Consolidated Exchange to such an extent that its members are now actively discussing the best means to bring about an improvement. Several of the plans involve the abolition of the "ticker service." "As the new exchange and the bucket shops," remarks Mr. Henry Clews, "have existence based only upon the quotations sent from the floor over the tickers, I suggest that the way to make the necessary warfare on these cormorants is to take away their tools, and for the New York Stock Exchange to abandon the use of tickers altogether pending the warfare, and go back to the old plan which existed before the invention of these tickers," giving greater patronage to the telephone. It seems hardly likely that the majority of the members will approve such a change, and it is certain that very lively opposition, direct and indirect, would come from those interested in the tickers. To many brokers such a cure would be worse than the disease.

THE property of heated gases to convey electricity has long been recognized, but some recent studies have extended our knowledge on the subject. Thus it is shown that the property is possessed in far greater degree than was first thought possible, and, even with the lowest electromotive forces employed, reaching to the thousandths of a volt, a current has been passed over the space between the electrodes, and this though the air was heated to a comparatively limited degree. This is sought to be explained by the assumption that the electricity is conveyed by hotter threads or streamers which course within the lesser heated particles. The experiments cited elsewhere point to the fact that it is well to so dispose contiguous conductors that no arc conveyed by heated air can be formed between them, given the conditions, of course, that the heating is not effected by the current within the wire itself. The theory of the action by which electricity is conveyed by hot air, and by which the counter-electromotive force is produced in the arc, presents a number of interesting points. By means of the phenomena observed, it becomes possible, as is well known already, to start an arc between two terminals without bringing them into contact.

THE latest developments in regard to the "B. & O. deal", are not a little interesting. Mr. Robert Garrett, in the letter we quote, declares the old negotiations broken off, though it does not appear that new ones have not been entered into. Another feature of the matter is the bid made by the operators' Brotherhood for the telegraph property. In some quarters ridicule is cast upon the scheme, but there is no sufficient reason why the system should not be worked successfully on a co-operative basis, with the right men in the responsible positions, and every worker sharing in the profits. Enterprises of a co-operative nature, quite as large as the Baltimore & Ohio telegraph system, are conducted with marked success in Europe, and it is a notable and familiar fact that American operators have always had in their ranks men of great executive ability. A glance around telegraphic headquarters in this country will show that most of the men at the head of affairs have won their way up by sheer merit and talent. It will be remembered that some such plan was proposed not long after the strike of 1883, but it fell through. One great difficulty to overcome is the raising of money enough to obtain a hold on the property, and this seems likely, even should no other objection arise, to thwart desires which have in them much that is creditable and praiseworthy.

Permanganic Acid in Secondary Batteries.

BY A. V. MESEROLE.

A trace of sulphate of manganese added to the dilute sulphuric acid solution used in lead secondary batteries appears to favor the forming process considerably. The effect is more marked in a Planté cell than in other types. The quantity of manganese should be about one-thousandth part of the electrolyte; a large proportion may cause a sediment to form in the cell which would be objectionable.

The presence of manganese in small quantity appears to cause the formation of permanganic acid when the cell is being charged. When the cell is fully charged a fine red color is noticed in the fluid, which fades away in time, or when the cell is discharged. The sulphate of manganese or permanganic acid formed by the action of the charging current appears to favor the oxidation of any sulphate of lead which may be formed on the plates and to aid the oxidation and reduction of the lead surfaces of the electrodes. Extended experiments have shown a decided advantage in actual work.

The Baltimore & Ohio "Deal."

The following is a letter written by Mr. Robert Garrett on July 20 to Mr. W. M. Singerly, the editor of the Philadelphia *Record*. It is the finale of the long continued negotiations over what has been known as the "B. & O. deal:"

"DEAR SIR: In reply to your courteous inquiry as to the real status of the negotiations called by the press, 'The Baltimore & Ohio deal,' I beg to say that all such negotiations are terminated. The syndicate which was to acquire a large block of stock of the Baltimore & Ohio Railroad Company in such a way as was believed would be beneficial to all parties and railroads concerned, did not at the appointed time comply with their engagements and all arrangements or negotiations with them are now absolutely at an end.

"I have not purchased stock of the Johns Hopkins University, as stated in some of the newspapers. I had the option on that stock and also upon that of several other holders, but I have not exercised these options, nor do I intend now to do so. The statement in some of the papers that I purchased large blocks of Baltimore & Ohio stock is a mistake. As I have stated, I had options, but circumstances rendered it unnecessary to close them. The Baltimore & Ohio Railroad Company, its properties, including its large telegraph system and the ownership of its stock, remain now as they were at the opening of the negotiations. The widespread public interest which these negotiations have created and the many false and foolish rumors to which they have given rise, justifies me in departing from my usual course in making this formal statement of their final termination. Thanking you for the kindly terms in which you have been pleased to refer to the Baltimore & Ohio company and its future, and acknowledging the correctness of your judgment and that of many other friends as to the propriety of making public this letter, I am, as ever, Yours very truly,

"ROBERT GARRETT."

It is probable that the close of the negotiations will be followed by litigation, suits being now threatened by Mr. Henry Ives, who was to have secured the property, and, it is alleged, to have turned the telegraph service over to the Western Union Company. In some quarters it is believed that negotiations are now going on again in another shape.

Wanting To Buy a Telegraph System.

It is said that an offer to buy the telegraph property of the Baltimore and Ohio Railroad Company has been made by the Brotherhood of Telegraphers of the United States. The sum offered is $3,000,000; $500,000 cash on the acceptance of the proposition, and the remaining $2,500,000 at the end of six months. This sum it is proposed to raise by assessing each member of the Brotherhood $50 a month for six months. There are, it is said, 21,000 members, and the leaders among them entertain no doubt of their ability to thus raise the sum required. The proposition is said to be looked upon with favor by the members. Each member of the brotherhood who contributed would be a stockholder and only brotherhood men would be employed.

The negotiations for the purchase of the Baltimore & Ohio plant have been conducted with the greatest secrecy and with such caution that neither Gould, Ives nor Sully knew they had such rivals in the field. Rumor has it that the Knights of Labor are lending a helping hand in the transaction. A co-operative telegraph company has been under consideration by such men as Campbell, the leader in the telegraphers' strike in 1883; J. B. Taltavall; Shaw, of St. Louis; Morris, of Chicago; Buckley, Quick and Tom O'Reilly, of this city, and many other prominent members of the profession. The committee having charge of the details of the proposed purchase, consisting of some of the above, have already waited on Mr. Garrett with the offer of the Telegraphers' Brotherhood. If the answer is favorable, details will at once be perfected so as to be ready for submission to the National Convention of Telegraphers, which meets at an early date. In addition to the support expected from the members of the brotherhood itself, it is anticipated that the Operators' Telegraph Company, a co-operative organization already in successful working trim in the West, will lend its money and influence to the promotion of the new scheme. It is thought by the operators that no difficulty will be experienced in collecting the assessment of $50 per month for six months from each of the 21,000 or more members of the brotherhood.

Researches on the Transmission of Low Tension Currents by Means of Hot Air.

In 1853 M. Ed. Becquerel discovered that gases raised to high temperatures would allow the passage of the electrical current even when this is due to only a single element of a battery. This discovery of the eminent physicist was doubted at first, but since then it has been clearly confirmed by M. R. Blondlot. In continuing the study of the transmission of the current by hot air, this experimenter has observed a certain number of facts which he brings to the notice of the French Academy of Sciences.

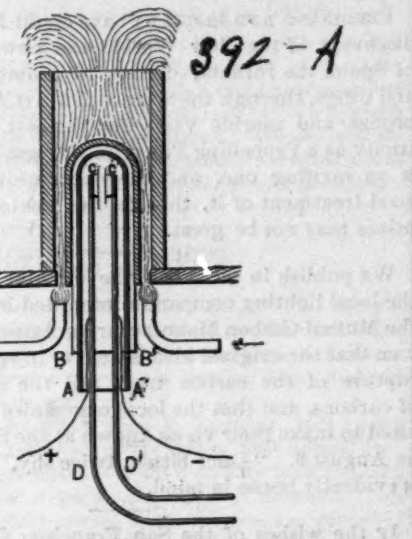


FIG. 1.—CONVEYANCE OF CURRENT BY HOT AIR.

Allowing the current to traverse a layer of motionless hot air, confined between perfectly insulated electrodes, recourse was had to the apparatus shown in Fig. 1. A glazed porcelain hood $A\,A'$ is fixed vertically, with the opening at the bottom. It is itself surrounded by an iron hood, and the whole is heated by means of a modified Pérot furnace.

The electrodes are placed in the hot atmosphere, which fills the upper part of the porcelain hood, and they consist of two platinum discs $C\,C'$, 3 cm. in diameter, supported by two platinum columns, which are themselves prolonged by the iron rods D and D', fixed to insulated supports. Two platinum wires, which are carried out of the hood without touching anywhere, establish communication between the discs and the outside apparatus.

In forming a circuit comprising a battery, the discs and a capillary electrometer, the fact already announced by M. Ed. Becquerel was at once verified, namely, that it is only when red heat is reached that the current begins to pass. But it was proved that the column of hot air which rises from an incandescent body allows the current from a single element to pass, when a thermometer plunged therein indicates a temperature of only 70 degrees Centigrade. This seems to show that the current of hot air consists of threads or streamers, of which some have a very high temperature and conduct the current exclusively.

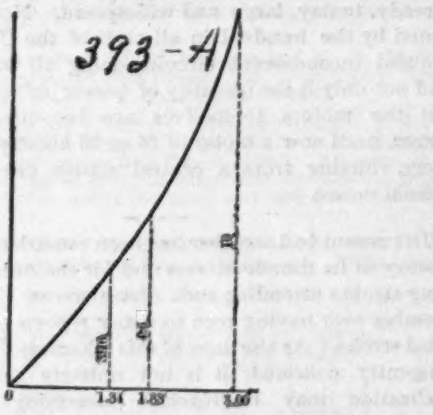


FIG. 2.—CONVEYANCE OF CURRENT BY HOT AIR.

Researches were next made to determine if, by using batteries with lower and lower electromotive forces, it would be possible to arrive at an E. M. F. below which the current would no longer pass; but, once the red heat is reached, the passage of the electricity takes place even with an E. M. F. of one thousandth of a volt; hence, if there is an electromotive force below which currents will not pass, it is extremely small.

The most extended portion of this work has had for its aim the solution of the following question: Are the laws of the transmission of electricity through a hot gas identical with those which govern this transmission by solid and liquid bodies? M. Ed. Becquerel has stated facts which are in contradiction to these latter laws. He has said that "the apparent resistance depends upon the intensity of the current and upon the number of elements of the battery."

M. Blondlot proposes to pursue the study of this question, and to determine if the principle of Ohm is applicable to hot air; or, in other words, if the amount of electricity which traverses the layer of hot air is proportional to the difference in potential of the electrodes which are on either side of this layer.

The principal difficulty of this research, according to M. Becquerel, proved to be the impossibility of maintaining the temperature constant. This difficulty has been met by a special method of compensation, and the flow instead of being proportional to the difference in potential, as is the case for liquids and solids, is, he believes, more rapid. The result of these experiments is represented by the curve shown in Fig. 2, of which the abscissæ represent the electromotive forces, taking as unity the E. M. F. of a sulphate of copper element, and the ordinates the quantities. The curve is strongly concave toward the top; it would have been a right line if air had followed the principle of Ohm.

It follows from this that hot air, properly speaking, has no resistance, and that, if one seeks to find the value of the same by known methods, he will find a number dependent on the E. M. F. and the intensity of the current, which explains the results obtained by M. Ed. Becquerel.

What is the mechanism of the transmission of electricity by hot air? The author thinks that it is that which Faraday calls "convection." That is to say, the transportation of the electricity by the particles of air coming to charge themselves on one of the electrodes, then being able to move themselves to the other by virtue of the electrical attractions and repulsions, and there discharging themselves.

The convection, impossible when cold, on account of the adherence of the air to the platinum, becomes possible when it is hot, owing to the cessation of this adherence. However, M. Blondlot adds that he is far from regarding this hypothesis as a demonstrated truth; for the rest, the experimental facts stated in his work are completely independent of the hypothesis.

Does Hydraulic Cement Protect Iron Pipes?*

This question came up last Tuesday at the meeting of the Commission on the Electrical Subway, in regard to laying the pipes in hydraulic cement. There seemed to be a difference of opinion on the subject.

Engineer McNulty, who was one of the engineers employed on the Brooklyn Bridge, said that his experience showed that hydraulic cement was a good preservative of iron. The anchorages of the Brooklyn Bridge were laid in cement. He examined part of these a short time ago and found the iron bright. His associate engineer, Mr. Buck, had examined the cables of the railroad bridge across the Niagara River after nearly thirty years had passed and found them in good condition. Mr. Roebling built a bridge across the Allegheny River in 1841, and when the cables, which were buried in cement, were examined in 1861, the cables were found comparatively uninjured. It was necessary that the iron should be clean and free from scale before being placed in the cement. He was confident that iron pipe laid in hydraulic cement would last longer than if laid in any other manner. Engineers Kearney and Beckwith supported Mr. McNulty.

General Averill opposed the use of hydraulic cement. He again exhibited the specimens of iron pipe taken from the government building in Chicago, which he said had been laid in cement, and were much corroded. Contractor Salter, who saw the pipes taken from the building, declared positively that the cement had to be broken from the pipe. The Mayor doubted the perfect protection of the pipe from the effect of air and water.

So good an authority as Trautwine makes the following statement on this point: "The writer found by ten years' trial that if, after setting, dampness is absolutely excluded, cements preserve iron, lead, zinc, copper and brass." Some of our readers will remember an article in *Building* (Vol. II., No. 5), an abridgement of a paper read by Mr. W. E. Ward before the American Society of Mechanical Engineers, at Cleveland, which, while making no direct statement on this exact point, would seem strongly to confirm the view that cement, so far from corroding iron, is an excellent preservative. We think the Mayor's doubt "as to the perfect protection of the pipes from air and water" is the real answer to General Averill's argument, and doubtless the trouble with the pipes he produces in confirmation of his views. It would seem as if pipes thoroughly embedded in hydraulic cement would have an almost perfect protection from air or water. As cement adheres very strongly to iron, and we think in cases where iron embedded in cement does corrode, the trouble is that the pipes were not clean, or for some other reason there was not a perfect union with the cement, and that after setting there was sufficient space between to allow access to air or water, and this, not the cement, corroded the iron.

* *Building*, July 23, 1887.

The Electric Motors of the Thomson-Houston Company.

For some time past the work of developing a line of electric motors suited for the transmission and distribution of power from central stations and for other purposes, particularly electric railroading, has been carried on by Prof. Elihu Thomson, at the factory of the Thomson-Houston Company. The object held in view was to construct machines of the highest type mechanically and electrically. Beginning with motors of one and one and a half horse-power, larger sizes, up to full fifteen horse-power capacity have been rapidly brought out, and still larger sizes are in process of construction.

The sizes now built are one and one and a half horse-power, three, five, seven and a half, ten and fifteen horse-power.

The motors are built for constant potential circuits of 110, 220, 400 and 600 volts, as needed, and they may be wound to suit other potentials. The proportioning is such that, supplied with a constant potential, they are practically self-regulating as regards speed, though the load be varied from nothing up to full power, or the reverse. At the same time the brushes on the commutator run without spark and are not shifted in position during extreme changes of load on the motor. In other words, the non-sparking points of the commutator remain at one position without change, notwithstanding the greatest variations of load.

The mechanical construction of the motor, as will be seen in the accompanying engraving, is such as to secure the greatest convenience in manipulation, perfect lubrication of the bearings and quiet running. The base is heavy and the standards which support the bearings for the armature shaft are very strong and stiff, and the position of the armature and commutator is such as to facilitate inspection of every part, and to secure freedom from damage, from dirt or from objects laid near the motor. Belting from the motor in any direction is also facilitated.

Electrically, the proportioning is such, it is claimed, as to secure the highest efficiency of conversion of electrical energy into mechanical energy. Tests have shown that over 90 per cent. commercial efficiency can be attained at full load. Each motor upon completion undergoes a series of tests, a record of which is kept at the factory.

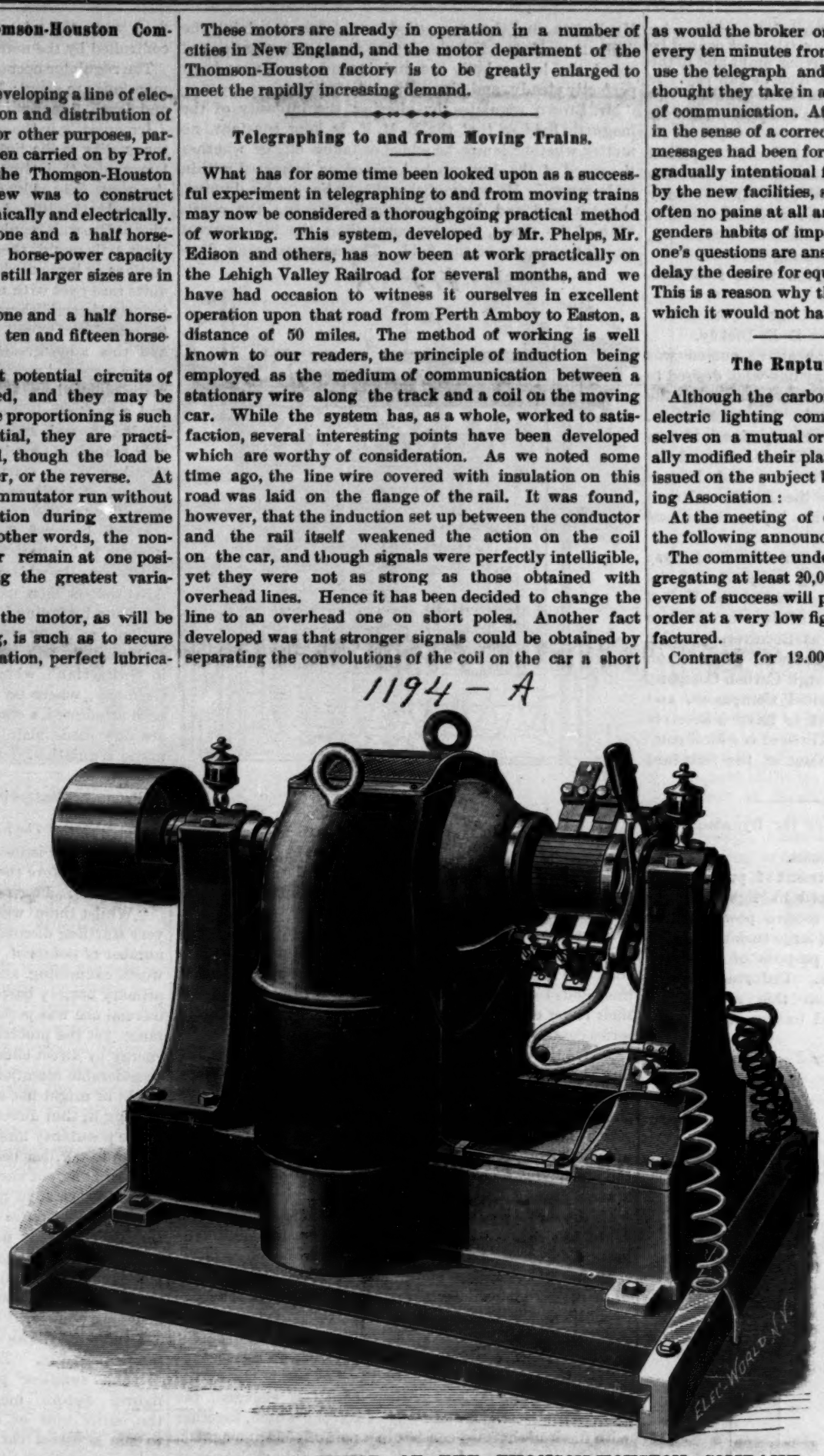
As will be noted in the illustration, the poles of the field magnets—the bodies or cores of which are round in section—project upward and inclose the armature, the section of the core of which is nearly square. The winding of the armature is a modified Siemens arrangement and the field magnet coils are in shunt to the armature.

The armature core is so well laminated and the resistance of the armature conductor is so low that loss by Foucault currents or local currents in the iron, and by internal resistance, is very slight as compared with the output of the machine. The consequence is that the moter keeps practically cold during running, and is capable of delivering power considerably in excess of its rated capacity.

The Thomson-Houston Company's motors were used to supply the power employed to drive the machinery in the recent Industrial Exhibition in the Coliseum Building at Lynn, a special circuit being run from the station of the Lynn Electric Lighting Company for the purpose. Besides supplying the power for several lines of shafting in which 15 h. p. and 7½ h. p. motors were used, an elevator was run by one of these motors of 5 h. p. capacity; large ventilating fans, a centrifugal pump, and other machinery was also operated. The circuit leading to the motors was fed by a current of constant potential from Thomson self-regulating dynamos, such as are used in incandescent lighting, and which were distant over half a mile from the motors.

Modifications in the framework of the motors, adapting them for use in electric railroading, are being carried out, a considerable demand for these motors so adapted having arisen.

The Thomson-Houston Company's motors being shunt wound they are capable of running under all the exigencies of practical work without other attention than to provide oil for lubrication, no switches or circuit changers being required,



FIFTEEN H. P. ELECTRIC MOTOR OF THE THOMSON-HOUSTON COMPANY.

These motors are already in operation in a number of cities in New England, and the motor department of the Thomson-Houston factory is to be greatly enlarged to meet the rapidly increasing demand.

Telegraphing to and from Moving Trains.

What has for some time been looked upon as a successful experiment in telegraphing to and from moving trains may now be considered a thoroughgoing practical method of working. This system, developed by Mr. Phelps, Mr. Edison and others, has now been at work practically on the Lehigh Valley Railroad for several months, and we have had occasion to witness it ourselves in excellent operation upon that road from Perth Amboy to Easton, a distance of 50 miles. The method of working is well known to our readers, the principle of induction being employed as the medium of communication between a stationary wire along the track and a coil on the moving car. While the system has, as a whole, worked to satisfaction, several interesting points have been developed which are worthy of consideration. As we noted some time ago, the line wire covered with insulation on this road was laid on the flange of the rail. It was found, however, that the induction set up between the conductor and the rail itself weakened the action on the coil on the car, and though signals were perfectly intelligible, yet they were not as strong as those obtained with overhead lines. Hence it has been decided to change the line to an overhead one on short poles. Another fact developed was that stronger signals could be obtained by separating the convolutions of the coil on the car a short distance from each other, so as to avoid mutual induction and retardation between them. In commenting on the system, the *Railroad Gazette* remarks that the increase of limited trains which make very infrequent stops would seem to be one of the phases of modern railroading which is likely to show the desirableness of a system of communication of this kind. The New York Central fast train keeps its passengers out of communication with the rest of the world about two and a half hours, while running between New York and Albany; and the Pennsylvania's limited occupies about three hours between Altoona and Harrisburg. It might be argued that the restless American ought, in justice to himself, to take a vacation of a few hours from his exciting affairs once in a while, and that if a few fortunes were lost in Wall street by this means no lasting harm would result; nevertheless many general passenger agents will doubtless deem it to their interest to accommodate their patrons with every convenience possible, and to the list of attractions, such as dining cars, "vestibules" and electric lights the train telegraph will have to be added by those who wish to keep just a notch or two ahead of their competitors. There is a mission too for this convenience on ordinary passenger trains. People are willing to pay liberally for relief from anxiety, and the fair patron who has left in the car a parasol or a yard of ribbon which she has traveled ten miles to purchase would bless the railroad for a prompt means of telegraphing to the train, as fervently as would the broker on the limited who desired reports every ten minutes from his office. The more that people use the telegraph and telephone the less care and forethought they take in all their affairs affected by this means of communication. At first the telegraph was used largely in the sense of a corrector of mistakes; for the sending of messages had been forgotten when the mail started. But gradually intentional forgetting, so to speak, was induced by the new facilities, so that now, with cheap rates, very often no pains at all are taken to send by mail. This engenders habits of impatience, for if half, or two-thirds of one's questions are answered, or wants supplied, without delay the desire for equal convenience extends to all wants. This is a reason why the train telegraph now has a field which it would not have had 25 years ago.

The Rupture of the Carbon Trust.

Although the carbon pool has been broken, the local electric lighting companies proposing to supply themselves on a mutual or co-operative basis have not materially modified their plans. The following circular has been issued on the subject by the Mutual Carbon Manufacturing Association:

At the meeting of committee at New York, July 21st, the following announcement was authorized:

The committee undertakes the securing of contracts aggregating at least 20,000,000 carbons per year, and in the event of success will positively be enabled to place entire order at a very low figure and for the best carbons manufactured.

Contracts for 12.000.000 are already assured, and you are invited to make application for such quantity as you may require for the term of one, two, or three years.

Since the failure (credit be where credit due) of the combination, the country has been deluged with offers of carbons at various prices. The committee advises that no notice be taken of them, but that a representative of your company be in attendance at the meeting of the National Electric Light Association at Boston, August 9, 10 and 11, vested with power to contract, providing price and quality are satisfactory, and the committee feels fully justified in guaranteeing these conditions.

If your company will find it impossible to be represented at Boston meeting and desire to avail yourselves of the committee's offer, address the secretary or chairman at once, and further information will be furnished.

CHAS. COOPER, Chairman,
Pres't Municipal Electric Light Company,
91 B'way, Brooklyn, N.Y.

WM. S. FREAR, Secretary,
Gen'l M'g'r Brush Electric Light Co., Buffalo, N. Y.

We are in receipt of the following letter with regard to priority in breaking the pool:

OFFICE OF FARADAY CARBON CO.,
PITTSBURGH, Pa., July 23, 1887.

To the Editor of The Electrical World:

SIR: We regret to see in THE ELECTRICAL WORLD of July 23d, the inclosed editorial giving the Boulton and Parker-Russell companies the credit of rupturing the carbon trust:

The carbon industry has undergone some remarkable vicissitudes during the last month or two, and the various changes of front on the part of some of those interested have been at once startling and sudden. Three months have sufficed to bring to naught the combination organized by the manufacturers to keep up prices at what they considered a fair figure, and to-day a local company finds itself in about the same position as a purchasing consumer that it was in last March—in other words, it can go into an open market and buy all it wants on a competitive basis. Several events have tended to bring about this state of things, and not the least, perhaps, of the causes of the dissolution of the combination was the resolve of some of the local companies to manufacture for themselves should no relief otherwise present itself. In fact, this alternative threatened from the outset, as did the possibility that other carbon factories outside the pool might be started, and that some of the parent companies might also establish works in order to serve their own licensees. The rupture of the compact soon became inevitable, and it occurred last week when the Boulton Company sold an enormous quantity of carbons at rates greatly below the schedule of the pool, and when the Parker-Russell Company, proceeding on similar lines, quoted lower prices and said pithily, "We have decided that no man can attend to our business as well as ourselves." It cannot be said that matters have yet taken

definite and permanent shape, but there is no reason why out of all this trouble a satisfactory settlement cannot be reached, insuring to the producer a living profit and to the consumer a good carbon at prices he feels he can pay. Is $12 to $15 a fair price for an honest article?

This is not only untrue as to those companies but does injustice to others.

We have in our possession a copy of a resolution passed by the carbon trust at Cleveland stating that "Whereas the Pittsburgh Carbon Co., Limited (now the Faraday Carbon Co.) has broken the trust, it is resolved that it is to the best interests of all that the business be wound up, etc.," signed by all the companies forming the trust.

Don't you think the prominence given those two companies editorially is unmerited?

FARADAY CARBON COMPANY,
per D. D. Dickey.

We will only say that the paragraph above quoted was not intended to do any injustice to any one who desired to have the credit of first rupturing the trust, and though the Faraday Company, as such, was not in the combination, and, therefore, did not leave it, we gladly give insertion to the above explanation and claim. The circular of the Parker-Russell Company from which we quoted dates as far back as July 15. The attitude of the Boulton Carbon Company was an open secret some time before the actual rupture occurred.

A special dispatch of July 26 from Cleveland says: "The pool of carbon manufacturing companies of the United States organized under the name of the United Carbon Companies is broken, and its affairs were put into the hands of T. C. McMillin to-day, as Receiver, by order of the court here, to wind up the business. The reason given for this step is that the Pittsburgh Carbon Company violated its agreement with the United Companies, and after consulting it was deemed best to have a Receiver appointed and dissolve the pool. Three of the local companies will consolidate under the name of the Standard Carbon Company."

Brown's Automatic Regulator for Dynamos.

BY OTTO GRUENINGER.

About eight years ago the department of public works at Zurich, Switzerland, commenced to light the city water-works by arc lamps. The motive power of the works is obtained from a number of large turbines, one of which serves exclusively for the purpose of supplying power to several private factories. Unfortunately the dynamo had to be driven from this source, and although a governor was attached to the turbine, the

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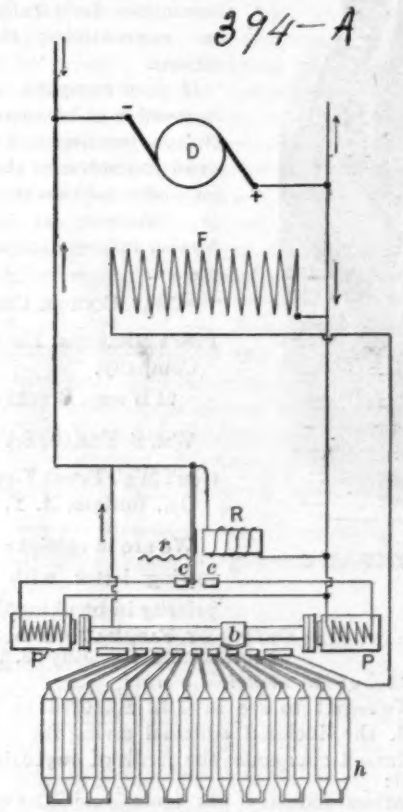

FIG. 3.—AUTOMATIC REGULATOR FOR DYNAMOS.

irregularities in speed were so great and constantly recurring that the electric plant never worked satisfactorily. The lamps burned extremely unsteady, and often they would fail altogether.

Last year the department decided to put in an entirely new installation with arc and incandescent lamps combined, and one that should not be influenced by the variations in the speed of the turbine. This was a very severe condition. A recording speed indicator showed that during the evening hours fluctuations at the rate of from 7 to 12 per cent. within time intervals of about two minutes were of regular occurrence, while at times these fluctuations even rose to from 15 to 40 per cent. Several firms which were invited for proposals declared it impossible to comply at all with such a demand. The well-known machine works "Oerlikon," near Zurich, however, whose electrical department is in charge of Mr. C. E. L. Brown, did not hesitate to take the contract and guarantee results. They applied one of their dynamos in combination with their automatic regulator, both being the inventions of Mr. Brown, and they succeeded completely in solving the difficult problem. Even under the greatest fluctuations of speed, the lamps, both arc and incandescent, now burn perfectly steady, and give entire satisfaction.

Mr. Brown regulates by altering the intensity of the magnetic field so that the E. M. F. is kept constant, no matter whether lamps be added or taken off, or whether the speed of the dynamo be lessened or increased within wide ranges. He accomplishes this by having his dynamo shunt-wound and by automatically varying the resistance of the shunt, thereby controlling the field current and the intensity of the field. The accompanying illus-

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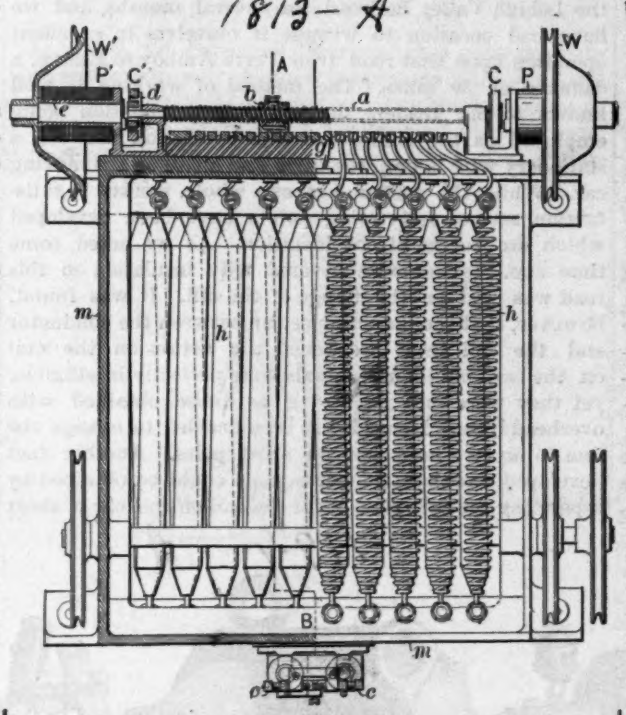

FIG. 1.—AUTOMATIC REGULATOR FOR DYNAMOS.

tration, Fig. 1, shows a front elevation of the regulator, partly in section, and Fig. 2 is a view of the apparatus as seen from below.

A cast-iron frame *m*, provided with lugs by which it can be conveniently attached to the wall, contains 40 resistance coils *h* in four rows of 10 each. These coils are secured at their ends to wooden insulators. By means of bolts at their lower ends and by the contact pieces *g* a continuous series connection is established among them.

Above the contact pieces *g* is a screw *a* with a traveling nut, the latter in its motion touching the pieces *g*. Thus, according to the position of the nut, a current, entering at the first of the pieces *g* and leaving through the nut and screw shaft *a*, has to pass through a greater or smaller number of resistance coils. Good contact is secured by the nut having a casing *b* which, by means of a spring, is always pressed down upon the contact pieces. In line with the screw shaft *a*, and secured to independent shafts *e*, are the sheaves *W W'*, which are kept in continuous motion, in opposite directions, by a belt from the counter-shaft in the lower part of the frame. This counter-shaft in its turn is connected with any convenient shaft or source of motion.

By very ingenious and effective couplings the shaft *a* can be coupled to either one or the other of the sheaves *W W'*, thus causing the nut to travel either in one or the other direction. With neither coupling engaged, the shaft *a* is at rest. *P* and *P'* are two coils which, together with the iron shafts *e* constitute a pair of electro-magnets. *C C'* are small wrought-iron discs which slide with an easy fit along the projecting ends of the shaft *a*, but which at the same time are positively coupled to it by pins *d*. Upon a current being sent through one of the coils *P P'* the corresponding disc *C* or *C'* is attracted, and firmly held to the pole end, thus establishing an efficient mechanical coupling between the screw shaft *a* and either *W* or *W'*.

The starting of such a current, as well as its direction into either *P* or *P'*, is automatically controlled by a relay *R* of a high resistance, shown in Fig. 2. A tongue *l*, attached to a peculiarly shaped armature *l'*, which is delicately pivoted between the projecting poles of an electro-magnet, either occupies some intermediate position between two adjustable contact screws *c* and *c'*, or is in contact with either the one or the other. By means of a spring *r* the position of *l* is so adjusted that it is central to *c* and *c'* when the standard E. M. F. is reached. With any change in the E. M. F. the tongue *l* either makes contact with *c* or *c'*, according to whether it is the attraction of the relay magnet or the force of the spring *r* which preponderates.

The diagram Fig. 3 plainly shows the disposition of the various circuits. *D* is the commutator of the dynamo, *F* are the exciting coils of the field. At *h* are shown the resistance coils, *b* is the traveling nut, and *P P'* are the coils of the coupling magnets. *R*, *r*, *c* and *c'* indicate the principal features of the relay shown in Fig. 2.

It is evident that this automatic regulator may also serve to maintain constant tension between any two points of a circuit. Should it be desirable to regulate a series-wound dynamo for constant current by this apparatus, then the resistance coils would have to be placed in shunt to th field, while the relay of a low resistance would have to be controlled by the main current or a certain portion of it.

The regulator occupies but little space. The outside dimensions are about: Height, 26 inches; width, 23 inches, and depth, 7 inches.

Irregularity in the speed of dynamos very sensibly affects the quality of the light, and in the case of incandescent lamps, also their durability. Even when such irregularities occur only at long intervals, they still shorten considerably the life of the lamps, and such a simple device as Brown's regulator, which effectually guards against these evils ought, therefore, to be doubly welcome. Fluctuations as large as those described above are fortunately quite rare; yet with most sources of power to be found in industrial establishments, the variations in speed are sufficiently large to call for separate motors for the dynamos, and this adds greatly to the cost. While there are cases where a special motor is to be preferred, there are a great many more where this additional expense could be saved and a most efficient electric lighting be obtained by adopting Mr. Brown's automatic regulation. It will unquestionably stimulate largely the installation of new plants. The Oerlikon Works started with automatic regulation toward the end of 1884, and so excellent and gratifying have been the results that, as a matter of fact, not a single compound-wound dynamo has since then been built by them. It is interesting to note what *Industries* in an article on Brown's regulator has to say on this point. Attention is there called to the surprising fact that, while compound winding has been in England a subject of litigation for some time, English dynamo builders for the most part continue to make compound machines, whereas in Switzerland, where there are no patent laws, and in Germany, where no monopoly of compound winding has been attempted, a comparatively large number of dynamos are now made plainly shunt-wound, combined with automatic regulation.

Primary Batteries for Electric Light and Power.

To the Editor of The Electrical World:

SIR: In your issue of July 2, I notice an abstract of a paper read before the English Chemical Society which interested me. I quote from it the following remark:

"Whilst there was not exactly a probability of any very startling discovery being made, there were still a number of points of interest connected with the subject worth examining, and although the hope of an improved primary battery based on actions of this kind for commercial use was perhaps not yet within measurable distance, yet the problem of economically obtaining current energy by direct chemical action was one now attracting considerable attention, and it is impossible to predict what might or might not be the result of systematic experiments tending in that direction."

The possibility hinted at in the above extract, the writer wishes to say, has been, he thinks, accomplished, so far as to obtain current energy by direct chemical action with such low cost as to render it available for "commercial use." The writer saw a battery in this city, and it is in the city now (but not on exhibition), of the following dimensions: Glass jar, 4 or 5 in. diameter, 7 in. deep; porous cup, 3 in. in diameter, 7 in. deep; zinc and carbon of size to suit the above; weight of entire cell, charged, about six pounds.

Twelve of those small cells glowed two 16 c. p. lamps steadily. The consumption of zinc is reduced to the smallest possible amount. I have not the figures before me, but this I may affirm, that the entire cost of current by this battery for power to run a street car twelve hours, would not exceed two dollars, including labor of charging, which can be easily

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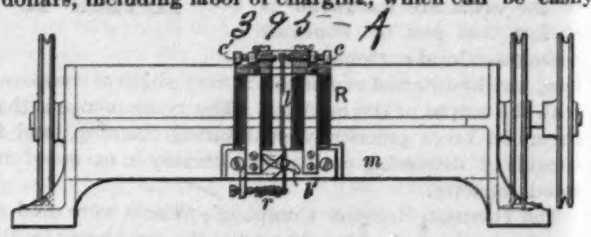


FIG. 2.—AUTOMATIC REGULATOR FOR DYNAMOS.

and quickly done and requires no skilled labor to do it. No dangerous chemicals are used, and no fumes are generated. The E. M. F. is high, being 2.5 volts per cell, and the current very strong and constant. The cost of one of the cells described above with all connections is less than *one dollar*, all of durable materials. Rubber or glass is used, as the kind of service may or may not expose it to breakage.

The inventor, who is a practical electrician of long experience, has experimented patiently, and is now over seventy years old, is no crank, but a patient worker in the line of chemical experiment to produce economically current energy by primary batteries for commercial use. The writer is not the inventor, but is able to demonstrate all he has said above. W.

NEW YORK CITY.

Opening of Pigeon Traps by Electricity.—At the pigeon shooting tournament, Woodlawn, L. I., of the Coney Island Rod and Gun Club, a method of opening the pigeon traps by electricity was adopted.

The Woodbury Engine for Electric Lighting.

Recognizing the high qualities demanded of an engine employed in electric lighting, both as regards economy and regulation, the Woodbury Engine Company, of Rochester, N. Y., have designed several sizes of engines constructed upon the general type of that shown in the engraving, Fig. 1.

The engine, as will be seen, is of the self-contained, single valve type, and the regulation is effected by an automatic cut off. Two centrifugally acting weights are employed, to one of which the eccentric is attached. The centripetal, or opposing force, is furnished by a single spiral spring, the two weights being connected by a link. The chief characteristic of the governor is in the adjustment, which enables the centrifugal and centripetal forces to be so balanced at all positions that the fluctuations in speed from light to heavy load, and with great ranges in steam pressures, are confined within very small limits. This is accomplished in the following manner: The link which connects the spring to the main weight has a series of holes corresponding with the same number of holes in the weight itself, as shown in Fig. 1. There are seven holes, and the sustaining pin, which takes the strain of the spring, fits through any hole in the weight and the corresponding hole in the link. By shifting the pin, therefore, the tension of the spring can be varied at will, and its sensibility increased to such a point that the travel of the valve and admission of steam shall correspond exactly with the load.

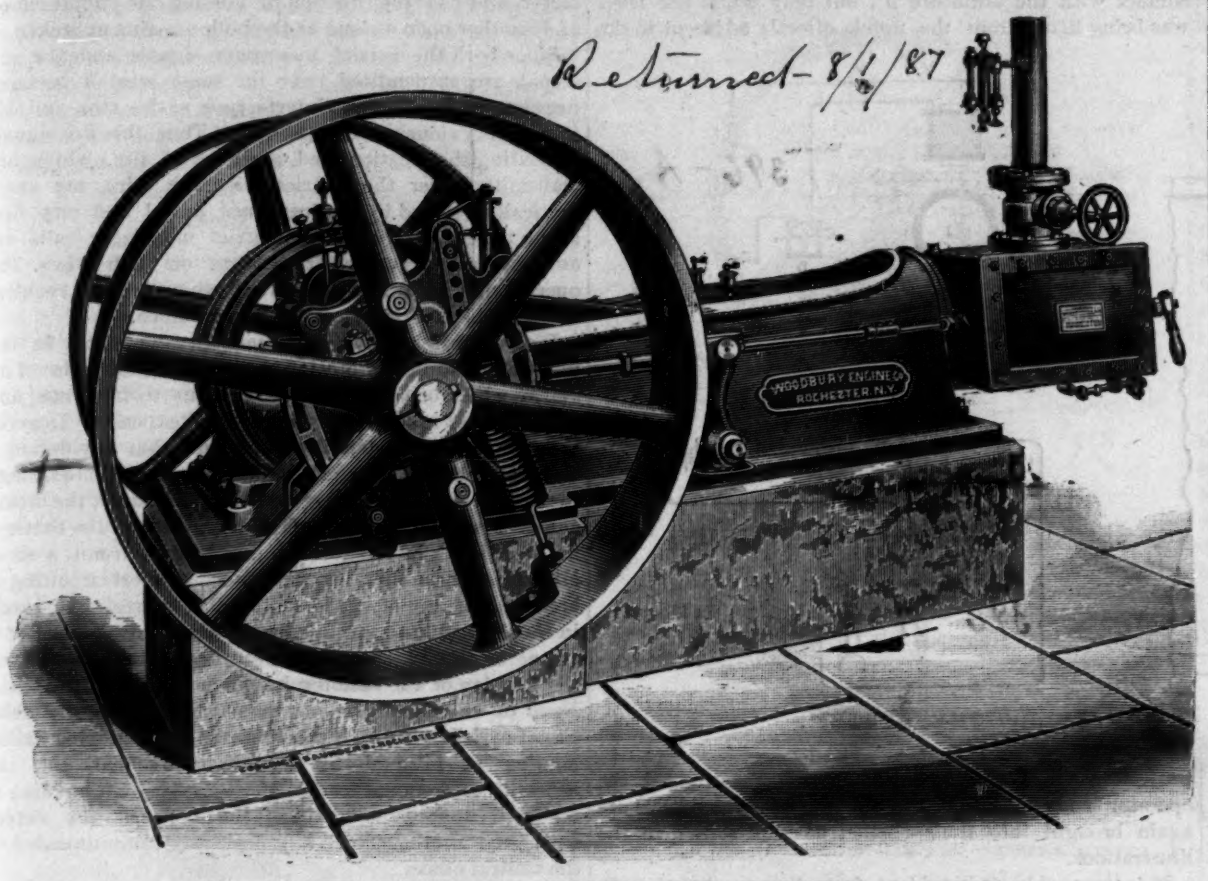


FIG. 1.—THE WOODBURY ENGINE FOR ELECTRIC LIGHTING.

The valve shown in section in Fig. 2 is of the flat slide form, and is wholly balanced by a relief plate on the back, so as to work in equilibrium. The relief plate has cavities corresponding with the cylinder face, and the valve slides between the two surfaces. The presence on the relief plate comes upon a double or forked wedge at top and bottom, shown in dotted lines. The longitudinal movement of the wedges controls the relative position of the faces, and the adjustment of the wedges is made by two screws, not shown, which pass loosely through their heads and tap into the relief plate. The handle *E* and screw *D* are not for adjustment, but to provide a means of temporarily separating the faces in starting the engine until all the parts are thoroughly warmed up, when the relief plate is let down into its normal working position by throwing back the handle. The adjusting screws which operate the double wedge are each provided with a collar, on which are cut one hundred notches; and as the movement of the screw to the extent of one notch represents a movement of the relief plate from or toward the valve of but 1-10,000th of an inch, the adjustment is micrometrical in its character, and is very simply and easily made. There being, however, no pressure upon the faces, the wear is very small in amount, and takes place so slowly as to require adjustment but once in several months.

The admission of steam takes place, as will be seen, at four points at the same time. In the position of valve shown, steam is entering past the end of the valve, both directly and through the cavity in the relief plate, whence it passes through an auxiliary steam port *a'* into the cylinder. Steam is also entering at the opposite end of the valve at two points and passing through supplemental passages into port *a'* and cylinder. The cut-off, of course, takes place at four points at once also. For the exhaust an auxiliary port is provided, so that it takes place at two points, as shown by the arrows.

By this means a sharp cut off is insured, and practically full boiler pressure is obtained in the cylinder. The exhaust also is free and without back pressure.

The shaft and pin are formed in one solid forging and the counter-balancing discs are held to the cranks with wrought iron clips passing around the cranks, and secured with nuts. The cranks are turned off at the end for the discs, which are bored out to fit, and the discs are therefore removable, and when replaced will run true.

All the parts of the various sizes of this engine are designed with a view to durability and economy, and the engines already in operation are said to give excellent results. The Stott Woolen Company, of Stottville, N. Y., have one of them driving its electric light plant, at a speed of 300 revolutions per minute; size 8 × 12. The Edison Company, at Rochester, has ordered one 16 × 20 to run at 200 revolutions.

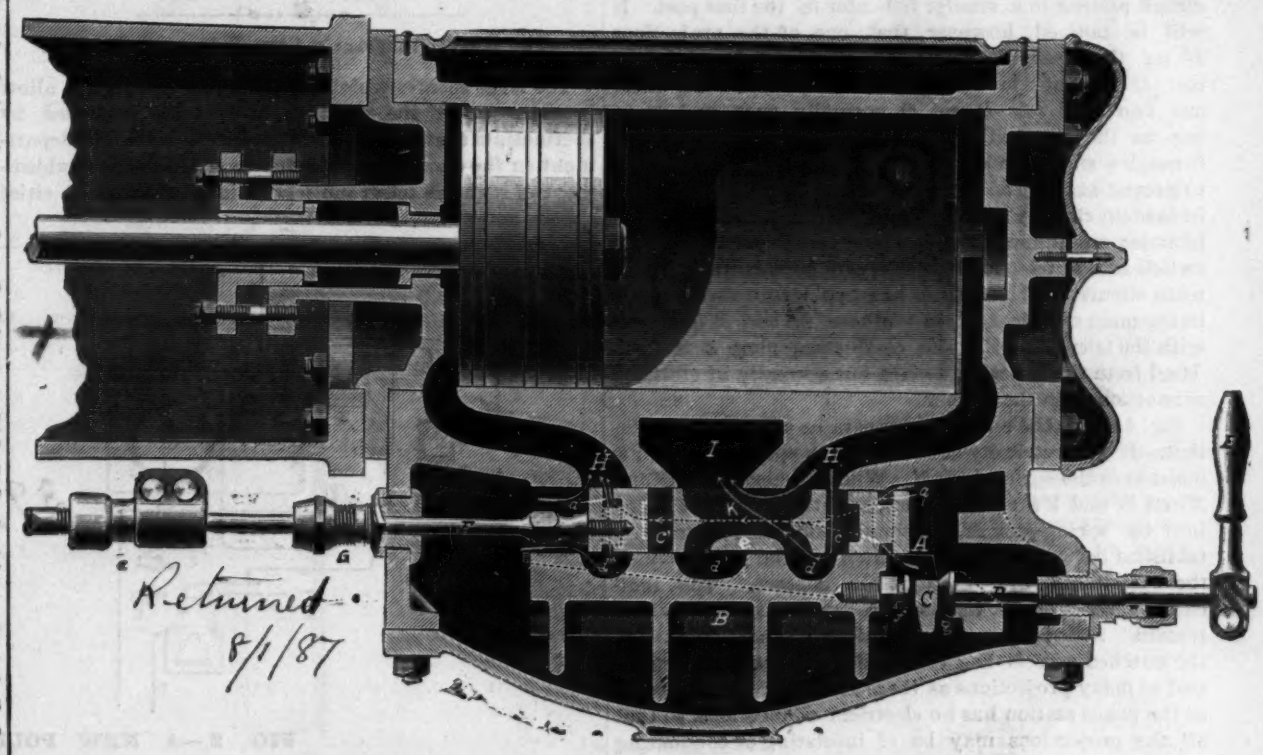


FIG. 2.—THE WOODBURY ENGINE—VALVE GEAR.

Tyndall and Faraday.

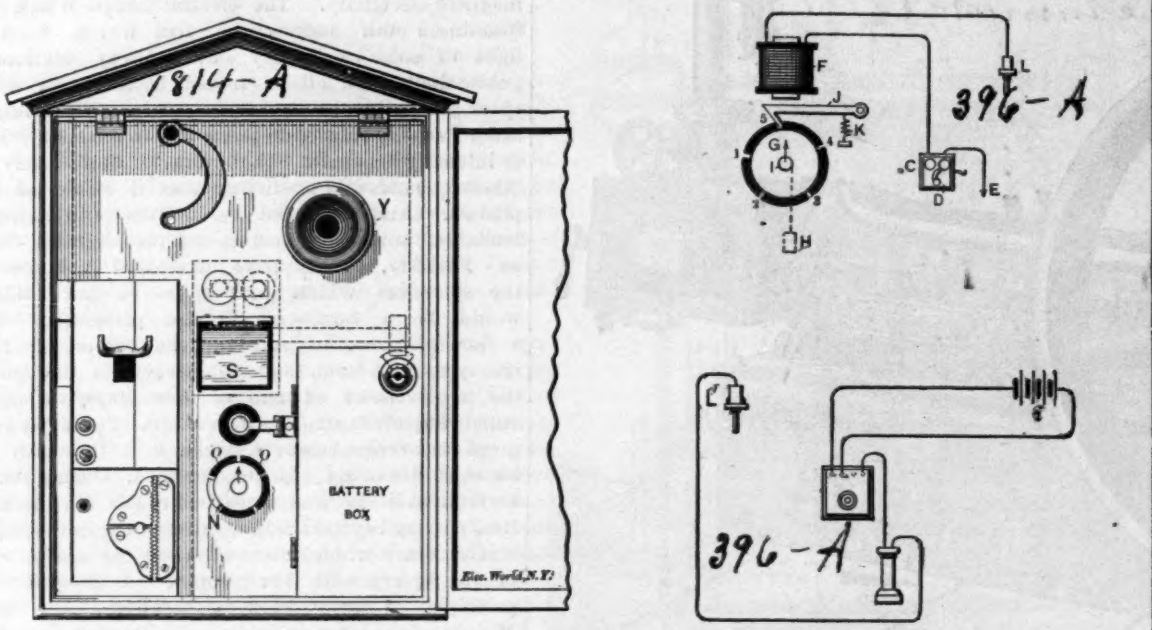
At the banquet given to Prof. Tyndall recently in London, on the occasion of his retirement from active work at the Royal Institution, that distinguished physicist, speaking of Faraday, said:

"In 1850, during a flying visit from Germany to England, I stood for the first time in the bright presence of Faraday. In February, 1853, I gave my first Friday evening lecture in the Royal Institution; and three months afterwards, on the motion of Faraday, the old Chair of Natural Philosophy, which had been filled at the beginning of the century by Thomas Young, was restored, and to it I was elected. It causes me genuine pleasure to think that I shall be succeeded in that chair by so true and so eminent a man of science as Lord Rayleigh. It is not my intention to overburden you with egotism to-night; but, casting an earnest glance back upon the past, a few words seem due from me to the memory of one or two of the group of good men, no longer with us, with whom I was so intimately associated. Regarding Faraday, I will confine myself to stating that years have not altered my estimate of the beauty and the nobleness of his character. He was the prince of experimental philosophers; but he was more than this—in every fibre of his mind he was a gentleman. I might point to the industries which affiliate themselves with Faraday's discovery of benzol, and with his discovery of the laws of electrolysis. But I need not go further than the fact that in this our day a noble and powerful profession has been called into existence by his discovery of magneto-electricity. The electric lamps which mildly illuminate our rooms, the foci which flood with light of solar brilliancy our railway stations and public halls, can all be traced back to an ancestral spark so small as to be barely visible. With impatient ardor Faraday refused to pause in his quest of principles to intensify his spark. That work he deliberately left to others, confidently predicting that it would be accomplished. And prompted by motives both natural and laudable, but which had never the slightest influence on Faraday, others have developed his spark into the splendors which now shine in our midst. It would be a handsome Jubilee present, if it were a possible one, to roll up the career of Faraday into portable form, and to offer it to the Queen as the achievement of one of her Majesty's most devoted subjects during her own reign. Faraday's series of great discoveries, however, began in 1831, which throws his work five or six years too far back. During the rest of his fruitful life he was a loyal son of the Victorian epoch. But, passing beyond the limitations of the individual, what is science as a whole able to offer on the golden wedding of the Queen with her people? A present of the principle of gravitation—a handing over to Her Majesty of the bit and bridle whereby the compelling intellect of Newton brought the solar system under the yoke of physical laws—would surely be a handsome offering. I mention this case of known and conspicuous grandeur in order to fix the value of another generalization which the science of her reign can proudly offer to the Queen. Quite fit to take rank with the principle of gravitation—more momentous if that be possible—is that law of conversation which combines the energies of the material universe into an organic whole, that law which enables the eye of science to follow the flying shuttles of the universal power, as it weaves what the Earth Spirit in 'Faust' calls 'the living garment of God.' This, then, is the largest flower of the garland which the science of the last fifty years is able to offer to the Queen. The second generalization is like unto the first in point of importance, though very unlike as regards its reception by the world. For, whereas the principle of conservation with all its far-reaching and, from some points of view, tremendous implications, slid quietly into acceptance, its successor evoked the thunder peals which it is said always accompany the marriage of thought and fact. For a long time the scent of danger was in the air. But the evil odor has passed away; the air is fresher than before; it fills our lungs and purifies our blood; and science in its Jubilee offering to the Queen is able to add to the law of conservation the principles of evolution."

Electric Power in Canada.—It is proposed by Messrs. G A. Haynes and R. D. McGibbon, of Montreal, and J. M. Mitchell and H. Iselin, of New York, to incorporate the Dominion Light and Power Company, for manufacturing electrical apparatus for lighting and power use. The capital stock is $100,000. The headquarters of the company will be in Montreal.

A New Police Telephone System.

In large cities where disturbances are likely to arise or accidents happen at any moment, it has come to be recognized that for efficient police administration it is necessary that the authorities at headquarters should be able to communicate at all times with the policemen on their rounds, and *vice versa* that the policeman should be able to communicate with headquarters so that he may summon assistance quickly in case of necessity. Such a system, embodying several novel features by which non-interference is obtained. has recently been devised by Messrs. W. H. Eckert and J. A. Seely, of the Metropolitan Tele-



FIGS. 1, 3 AND 4.—A NEW POLICE TELEPHONE SYSTEM.

phone Company, of this city. The system consists in general of a central station at police headquarters, substations at the various station houses and "posts," or policemen's boxes. The first two kinds of stations are connected telephonically in the usual manner. The two latter are connected in a special manner which will be described presently.

The policeman's post is shown in perspective in Fig. 1, and in the diagrams, Fig. 2 and 3, the boxes with their containing mechanism are shown in detail. Figs. 3 and 4 show the details at the police station.

The system consists of a magneto bell *C* having an earth connection *E* and an indicator *G* in connection with the bell. The indicator consists of the magnet *F*, which has a pivoted armature *J*, which presses into one of the teeth of a notched wheel *G*, the latter tending to rotate under the influence of the weight *H*. In circuit with the indicator is a plug *L*, which fits with the spring-jack *M*, the circuit passing to a similar indicator in the first post. It will be noticed, however, that one of the projections *N* on the notched wheel *G'* is of metal, while the rest *O* are of insulating material; and that there are two terminals *P* and *Q* normally open and pressing on the notched wheel. The circuit then passes through a similar indicator *G''* at the next post and then to ground at *E'*. The terminals *P* and *Q* and *P'* and *Q'* are in branch circuits *R* and *R'* and normally open and each includes an annunciator *S*. Each post contains also a switch and a telephone which can be thrown into the main circuit *T*. The switch has two terminals *U* and *V* in the main circuit and two others *W* and *X* in circuit with the telephone *Y*. The conducting plug *Z* is insulated from the lower terminals, but normally in electrica connection with the former.

Fig. 4 shows the telephonic apparatus at the police station. It is electrically connected to the plug *L'*, which is inserted in the spring-jack *M*. When the terminals *W* and *Z* and *W* and *V* are in contact, and the plug *L'* is forced into the spring-jack *M*, telephonic communication is established between the police station and the post at which the terminals are brought in contact. The indicators all have hands or pointers *a*, which remain in permanent positions, and each of the notched wheels has the same number of projections and as many projections as there are posts. The wheel *G* at the police station has no electrical connections, so that all the projections may be of insulating or conducting substances; but in order to operate properly, each of the wheels *G'* and *G²* at the posts has one of the projections of metal, and, further, these metal projections are one ahead of the other in the successive posts. Thus, as shown, the projection *N* is one space ahead of the projection *N'*.

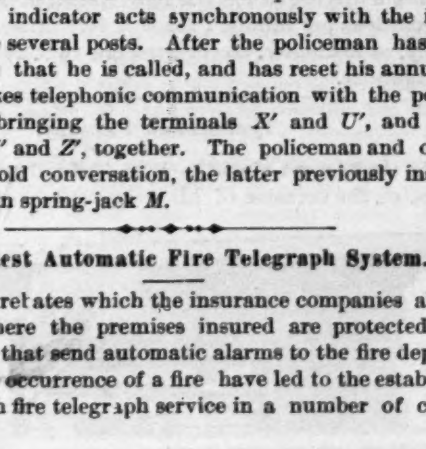
The mode of operation between the police station and a post, *B*, for instance, is as follows: If the operator at the police station desires to notify the policeman at post *B* that he is wanted, he inserts plug *L* in the spring-jack *M* and sends an electrical impulse over the line by means of the magneto bell *C*. The momentary current of electricity energizes the magnets *F*, *F'* and *F²*, which raise the armatures *J*, *J'* and *J²*, which in turn allow the wheels to rotate until the armatures fall into notches 1 in each projection *N*. When the annunciator *S'* has dropped, the operator sends pulsations over the line until the wheels are again brought into their normal position shown in the illustrations.

It is impossible, as is evident from the construction, to operate more than one of the annunciators simultaneously. Further, an annunciator at any post is operated to signal a policeman only when an electric impulse is transmitted while the armatures are between the notches. The operator also becomes aware of what post he is calling, because his indicator acts synchronously with the indicators at the several posts. After the policeman has become aware that he is called, and has reset his annunciator, he makes telephonic communication with the police station by bringing the terminals *X'* and *U'*, and also terminals *W'* and *Z'*, together. The policeman and operator then hold conversation, the latter previously inserting plug *L'* in spring-jack *M*.

The Guest Automatic Fire Telegraph System.

The large rebates which the insurance companies allow in cases where the premises insured are protected by thermostats that send automatic alarms to the fire department on the occurrence of a fire have led to the establishment of such fire telegraph service in a number of cities in this country. In a still greater number the district messenger service has been introduced, but heretofore, as a rule, both such systems have been worked independently of each other. It was in order to combine both into one, so that they could be operated from the same office and over the same wires without interference, that Mr. J. H. Guest, of this city, devised an arrangement which we witnessed in operation recently.

The system of Mr. Guest may be arranged in any one of several different ways; for example, the local or building circuits may be arranged to turn in the box number of the building and location of fire over a general circuit by suitable alarm and registering devices, direct to the office of the fire patrol or district office of the fire department. The arrangement, however, is specially adapted to be operated in connection with a district telegraph system, the fire signals being turned in to the central office of the company, and from there automatically relayed to the fire department, and this without any interference whatever with the transaction of the usual business of the district telegraph system. The thermostat employed by Mr. Guest consists of a small thermometer bulb so constructed as to be broken by the expansion of the mercury contained therein on a rise of temperature to a prearranged degree. This thermometer bulb forms part of a spring circuit-closer, and has the function of holding one circuit closed and another open so long as the bulb remains unbroken.



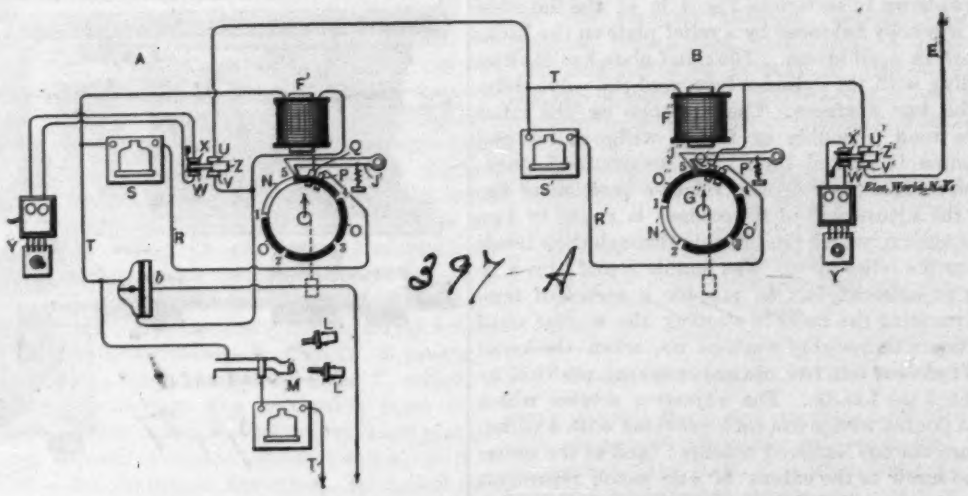


FIG. 2.—A NEW POLICE TELEPHONE SESTEM.

Since both the district messenger signals and the fire signals are transmitted over the same wire it becomes necessary to prevent the interference of the two, and this is very ingeniously accomplished. Thus the fire signals indicating the location and presence of fire, which are transmitted over the district telegraph wire, are automatically relayed to the insurance patrol and city fire-alarm telegraph wires, but district messenger calls are automatically prevented from going on such wires. The operation of both these signals is automatic and requires no personal supervision at the central office.

It sometimes happens that mere derangements in the wires of buildings protected cause the sending in of an alarm which brings the fire apparatus to the scene, and hence causes much inconvenience and expense. To avoid this, Mr. Guest's system is so arranged that any derangement of the apparatus in a building to be protected, such, for instance, as the running down of the battery, the breakage of a battery wire, the short circuiting of the battery, an accidental breakage of a thermostat circuit, a short circuiting of the thermostat contacts, or short circuiting or breaking of any of the local building wires, will result in the immediate transmission to the central office of a signal of special character, indicating derangement and the location of the building in which the difficulty exists. None of the derangements mentioned will give a false signal of fire. Through this feature, the annoying transmission of false alarms is entirely avoided, and the necessity of frequent testing of apparatus in a building is rendered unnecessary; since, the moment the defect exists, the intelligence of it is instantly communicated to the central office.

Besides the indication of the derangement on a local circuit, any derangement of the district telegraph wire is also made known at the central office; but no matter what the nature of the trouble may be, the arrangement is such that the fire signal can still be transmitted and received. The simultaneous transmission of the two kinds of signals, messenger and fire, causes no confusion, each being received separately.

In the lack of explanatory diagrams, which we are necessarily obliged to withhold, the manner in which all this is effected would be difficult of explanation. But, as stated above, we have seen the system in operation, and have had occasion to witness some severe tests made with it, in addition to those enumerated above. We may add that the New York Board of Fire Underwriters has granted a rebate on all premises protected by this system.

Electric Protection from Water Overflow.

It not infrequently happens that considerable damage is done by the bursting of pipes or the leaving open of water cocks. In order to make such occurrences impossible, the Electric Water Protective Company, of this city, is now introducing a system invented by Mr. Leopold Weil, which provides for the entire shutting off of the water from a building when the latter is unoccupied.

This is accomplished in a very simple manner, and at the same time an alarm is given which indicates any derangement or failure of water to be shut off.

To accomplish all this, the keys of the building to be so protected are placed in a box and suspended by a swinging hook, which, according to whether or not the keys are hung from it, opens or closes a circuit leading to an electro-magnet. The latter is placed near the main supply cock of the building. This cock has a lever attached to it, at the end of which is a chain and ball

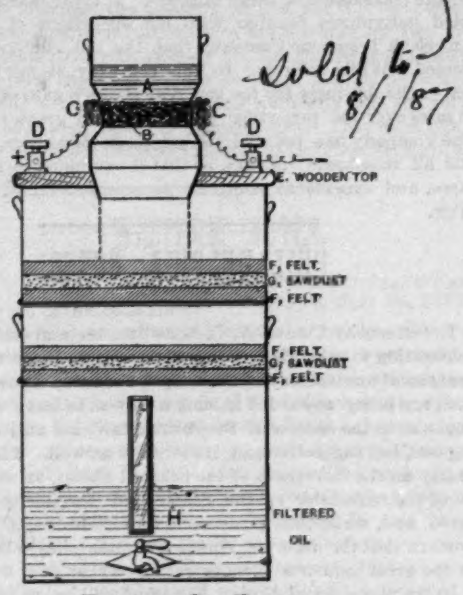
The latter is maintained in an elevated position by a latch controlled by the armature of the electro-magnet above referred to. As long as the keys remain on the hook in the box, the magnet is not energized, and the water cock remains open, so that the building is supplied with water. Upon removal of the keys to lock up, however, the key-hook is drawn up by a spring and closes the circuit of the electro-magnet. This releases the suspended weight, which in its fall carries over the lever attached to the cock and closes the valve, shutting off the water completely.

The box containing the keys is provided with a spring hinge, which permits of a signal being given when the box is opened, showing that the circuits are in proper order. By a similar method, overflow in tanks and wash basins can be prevented. In this case the circuit is closed by an ingenious float arrangement or hydrostat, and thus damage is prevented. The system is now on exhibition in this city, and appears to operate very satisfactorily.

An Electric Oil Filter.

In electric light stations as well as in other places where machinery requiring constant lubrication is in operation, great economy is effected by using the oil over and over again until it is spent. After each use, however, it becomes necessary to remove the impurities from it which have been taken up in its course through the bearings, such as finely ground metal and dust, etc. Quite a novel device to accomplish the latter purpose thoroughly has been designed by Mr. C. F. Dunderdale; and the apparatus itself, which is shown in the accompanying illustration, is manufactured by the Electric Filter Company, of Chicago.

As will be seen in the illustration, the filter is of cylindrical form and covered with a wooden top which supports a smaller cylinder, *A*, contracted at the middle. Around the contracted portion a coil of wire *C* is wound and connected to the binding posts *DD*. Within the portion surrounded by the coil the cylinder is filled with iron borings *B* to a depth of several inches. When a current



ELECTRIC OIL FILTER.

is passed through the coil, the iron borings are intensely magnetized, converting each particle into a minute electro-magnet.

The oil, in filtering through these borings, has all the particles of iron, and, according to the inventor, even the alloys ground from the bearings, separated from it, they being attracted by the magnetized borings. The oil then passes through the other filtering devices, consisting of heavy felt cloths having a layer of fine sawdust between them, and finally collects in the bottom receptacle free from all impurities.

As stated above, the inventor asserts that even non-magnetic particles, such as brass or babbitt metal, are separated, which would make the effect due to some cause other than magnetic; or, possibly, the iron impurities in these metals may be sufficient to cause their retention by the magnetized iron borings. Whatever the cause, the oil, it is claimed, is deposited in the lowest receptacle in a clear condition and ready for immediate use.

The Gould-Tisdale System of Electric Railway Signals.

The principal objects to be sought after in a system of railway signals are simplicity, and such an arrangement that any accident or mishap to the apparatus will set the signal at danger. Such a signal has lately been designed by Messrs. Gould and Tisdale, of Boston, and its method of operation is shown in the accompanying illustrations. The signal is arranged for a semaphore or form signal by day and at night for a lighted bull's-eye. Upon the top of a post on a level with the engineer's eye is placed an electro-magnet covered by an iron case. From the case there rises a standard carrying a semaphore weighted on the right hand in such a manner that, if perfectly free to move, it would fall so as to place the semaphore in a horizontal position, that is, to "danger." To the left of the pivot upon which the semaphore swings, a rod is attached which is carried down and is fixed to an armature opposite the electro-magnet contained within the case at the top of the post.

The line leading to the magnet may be of any length and has a gravity battery in circuit with it. When the road is clear, the signal man closes the switch of the circuit, which is metallic, and thus by energizing the magnet attracts the armature and pulls up the semaphore to an oblique position, as shown in Fig. 1.

If it is desired to stop a train, the opening of the circuit

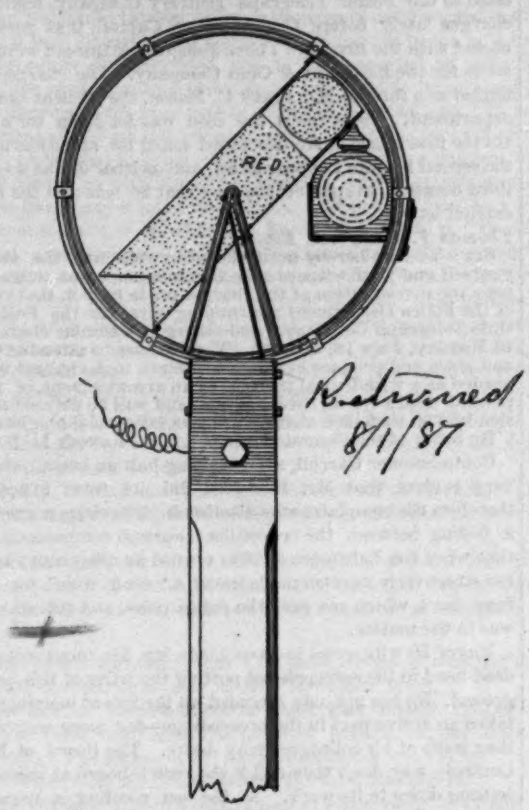


FIG. 1.—GOULD-TISDALE SIGNAL.

at the switch releases the armature and the unbalanced weight of the semaphore causes it to fall to the horizontal position, as shown in Fig. 2.

At night the bull's-eye shows a white light when the road is "clear," but when the semaphore falls to the position of danger the red glass placed in the end of the arm shows a red light to the engineer.

By the arrangement adopted, any defect in the continuity of the line wire, such as a break or cross, will evidently cause the demagnetization of the magnet and effect

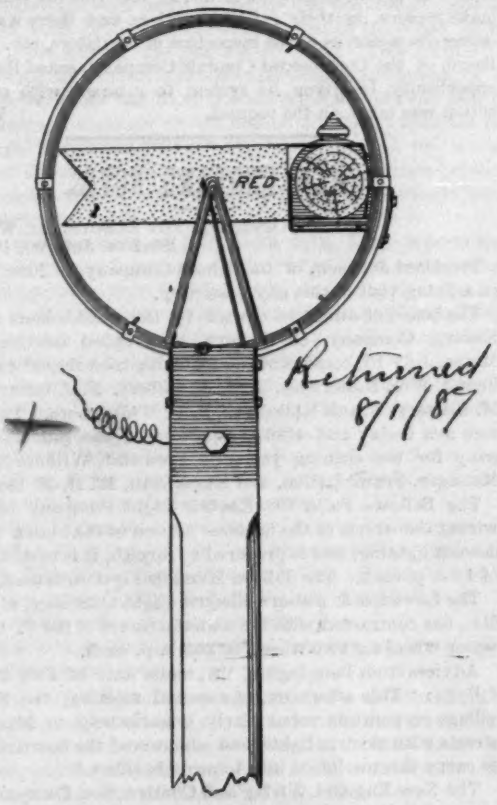


FIG. 2.—GOULD-TISDALE SIGNAL.

the setting of the signal to danger. Thus any trouble becomes apparent at once and can be remedied, while, at the same time, accidents to trains are averted.

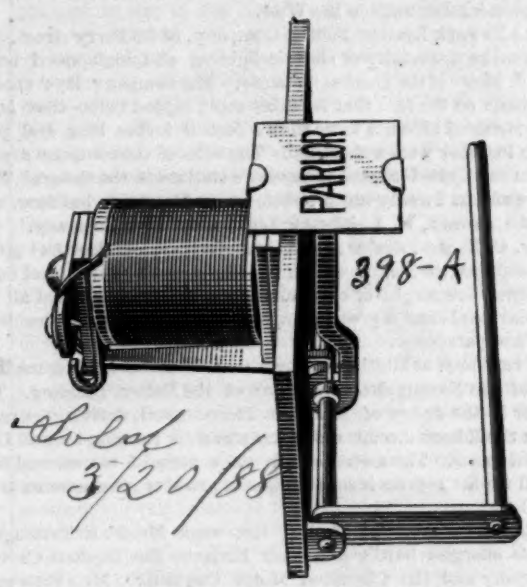
Electric Applications in Canada.—Steps are being taken in Canada for the incorporation of the Electric Service Company of Canada (Limited), whose object is to carry on the business of manufacturing electrical apparatus of every description; to build, sell and lease lines, to establish a system of day and night watch, and to do other work of like character. The capital stock is $100,000. The persons chiefly interested are D. S. Stevenson, H. Hogan, H. Graham, H. McKenzie and J. A. Wright, of Montreal.

Electric Alarm Signals on the Berlin Metropolitan Railroad.

The Metropolitan Railroad of Berlin, says the *Railroad Gazette*, has adopted the apparatus of Siemens Bros. for signaling from trains between stations. The stations being very near together, the nature of the help required by a train signaling from an intermediate point it is not necessary to specify. In the case of a call, the terminal station sends a locomotive at once, and it is sufficient to notify this station of help wanted, and to warn all other stations that a locomotive is to pass, coming from the extremity of the line. At each station, placed on a single wire, is an apparatus which consists of an electro-magnet, with the necessary mechanism, inclosed in a wooden case below which are the call bells. On the face of the box is a dial, divided in two parts, one part having the names of the stations in black, the other the same names in red. Under the dial are two buttons, one below the other, and a crank which serves to set in motion the magnet. Turning the crank from left to right and pressing on the upper button, the index of the apparatus moves to the right; by turning the crank in the other direction the movement of the index is reversed. Pressing on the lower button and turning the crank sounds the bells. In calling for aid, therefore, the upper button is pressed, the crank is turned from left to right until the needle is at the extreme point to which it can go, the lower button is pressed and the bells are sounded. Then by pressing the upper button and turning the crank from right to left, the index is brought to the point on the dial containing the name of the station which calls for help. That is, the dial announces an accident, the index indicates the name of the station where help is required, as well as the terminal station from which it has been called, and the same signal appears all along the line.

A Novel Annunciator Drop.

The accompanying illustration shows a novel annunciator drop devised by Messrs. E. A. Wildt & Co., of this city, and employed in the annunciators manufactured by



NEW ANNUNCIATOR DROP.

them. The drop it will be seen, is maintained normally in a vertical position by an armature, which has a hook at its end that engages with the drop. When a call is sent in the magnet is energized, it raises the armature and the hook clears the latch in the drop, so that the latter falls. The acting force is gravity, and no springs are employed in the construction. The swinging rod below the annunciator serves to raise the drop to its original position.

A Modest Suit.—Mr. Wilson, of James street, Lynn, Mass., has attached the Lynn Electric Light Company for the sum of $10,000, having commenced suit in an action of tort to recover of the company, Mr. Wilson claiming that the company destroys the peace and quiet of his home, and, therefore, he condemns its works as a nuisance.

Electric Lighting in Madrid.—A large electric ligh station is projected in Madrid, a plot of ground having already been selected for this purpose in one of the outlying districts, from which, says *Industries*, it appears that it is intended to use the transformer system. The motive power will amount to 2,500 h. p., the engines being of English make, and Naeyers or Belleville boilers being employed. The dynamos will probably be from the Oerlikon works.

Electricity in the House.—The Boston *Advertiser* quotes in extense the recent article in THE ELECTRICAL WORLD, on "Electricity in the House Beautiful," and says editorially: "An account which appears in this issue of the widely diversified use of electricity in the new summer residence of Mr. E. H. Johnson, president of the Edison Electric Light Company, will be read with general interest. In the fitting of this house the extraordinary adaptability of electricity is curiously set forth. Mr. Johnson has been quick to perceive the value of novel appliances of electricity, and is singularly expert himself in fashioning devices to suit his requirements. It is apparently his maxim that everything can be done nowadays by electricity that is worth doing at all, and not content with currying his horses by means of electric motors, he may soon be expected to provide an electrified valet for himself."

NEW YORK NOTES.

OFFICE OF THE ELECTRICAL WORLD,
NEW YORK, July 25, 1887.

As one opposition telephone company is "knocked out" another springs up. Judge Wallace has this week given a coup de grace to the Globe Company, but a new gladiator comes forward in the shape of the American National Telephone Company, operating under the Banta patents, and having offices at 26 Broadway. You illustrated part of the apparatus last week. Of course no new development is complete nowadays unless Standard Oil people are in some manner interested in it, and so we are told that they are connected with this. I hear that the company will go right ahead, make or break, with their make-and-break instrument, and will at once construct central exchanges and put up lines in the principal cities. If they do not begin business now they will be ready for it on the expiration of some of the patents in 1892, but the company is said to mean business *now*.

Mr. H. N. Curtis, representing the Thomson-Houston Company here, has an order for a plant of 35 lamps, 2,000 c. p., for the Schwarzchild & Sulzberger Refrigerating Company, Forty-fifth street and First avenue. The plant put in on the firework grounds at Manhattan Beach by Mr. Curtis is running very successfully, and rendering good service under somewhat exacting conditions as to distribution of light and cutting in and out. The New Rochelle Thomson-Houston plant recently put in through Mr. Curtis is also operating very nicely. The original 50-arc plant has been increased to 80 and will soon be 100, and the 500 light incandescent plant on the alternating system is going ahead rapidly. Series incandescents are also being run off the arc circuits, and the new service promises altogether to become quite popular not only for streets and stores but for residences.

You have recently made mention of the work being done by the Sawyer-Man Company in knitting mills, especially around New York, where Mr. Bernard has had a chance to get at them. Gen. C. H. Barney gives me the following list of new installations: Phœnix Manufacturing Company, silk mill, Paterson, N. J., 150 lights; G. Morlot, Paterson, 400 lights; Helvetia silk mills, Paterson, 150; W. Meesch, silk mill, same place 100; Union Knitting Company, Hudson, N. Y., 150; J. A. Hober, Stockport, N. Y., knitting mill, 75; W. S. C. Wiley, Catskill, N. Y., 150; Mohawk Valley Knitting Company, 150; H. P. Ramsdell, Salisbury Knitting Mill, N. Y., 50; Hudson River tunnel, 200 lights, alternating system. The company are also putting plants in six or seven lumber mills in the West.

The Newark Leather Belting Company, of 32 Ferry street, this city, make a specialty of electric lighting and high speed belts. Mr. J. Meier is the general manager. The company lays special emphasis on the fact that it makes short lapped belts—that is, it uses pieces of hide not more than 4 feet 9 inches long and puts them together with a short lap. The belts of the company are in use in the United States Company's stations in the General Post Office and at Twenty-ninth street, in the Equitable building, and by the Newark, N. J., Electric Light and Power Company.

Mr. C. Baxter, dealer in and manufacturer of electrical goods and supplies, 40 Fulton street, Brooklyn, issues a neat and comprehensive catalogue of over 60 pages. In it will be found all the regular goods and a great many specialties worthy of consideration and patronage.

A very neat exhibition with an electric motor is being made in one of the Nassau street windows of the Potter Building. The motor is the design of Mr. J. A. Barrett, and, deriving current from the Edison circuit along the street, is running a small Universal press. The motor stands on a strip of carpet, and is so small while the press is so large that it attracts great attention all day long.

I had the pleasure of meeting last week Mr. F. E. Pettengill, whose energies hardly find their limit in the Boulton Carbon Company and the Cleveland Motor Company. Mr. Pettengill represents in fact the Standard Carbon Company, just incorporated, and including the former Boulton, Cleveland and Crystal carbon companies, with a capacity of 100,000 carbons a day. It is said that Mr. Pettengill was one of the first to realize the change about to be made in the "pool," and that "jumping into the ring," he had sold no fewer than 2,000,000 carbons before July 21. As to motors, Mr. Pettengill reports a very brisk demand, allowing of no accumulation of stock, but keeping the factory in full blast all the time.

I have the following items from the American Electric Manufacturing Company:

The American Illuminating Co., of Augusta, Ga., which was incorporated in December last, is meeting with wonderful success and is in a marked degree a brilliant example of what can be accomplished in the electric lighting field by giving to it the same attention which every other successful business receives. Starting out with an installment of 85 lights in January, it was not long before an increase was found to be absolutely necessary, and another 25 light machine and lamps was added. The steadiness and quality of the light produced created such a demand for the American light that a further increase has become imperative. The directors have just ordered from the American Company an additional 100 lights, and have contracted for an additional 200 horse-power engine, and will then have one of the largest and finest electric light plants in the South.

The American apparatus recently installed on Staten Island at St. George and Erastina, for Mr. Erastus Wiman, of the Staten Island Amusement Co., is said to be one of the best working electric plants in the United States. The great spectacular show, "The Fall of Babylon," is probably the finest piece of mechanism of the kind ever invented or operated in the open air. Its great success thus far has been largely due to the excellence of the electric apparatus which is used to illumine it at night. The boat which takes passengers over to Staten Island to St. Georges, passes in direct view of the Bartholdi Statue in the harbor, which is also illuminated by the American apparatus.

The American Electric Manufacturing Company is not only meeting with success in the large sales of its apparatus and the extension of its business in the United States, but is rapidly extending its business into the different parts of Europe. The company has recently appointed Mr. Charles R. Heap, a brother of Major David Porter Heap, of the corps of engineers of the United States Army and Engineer Secretary of the Light-House Board, Washington, their resident representative in London. Mr. Heap is an accomplished electrician, having passed many years in electrical work in England, France and Germany. Mr. Heap has been spending several weeks in New York with the American Company in the study of the American apparatus with Mr. Wood, the chief electrician of the company. Mr. Heap sails for Liverpool in about two weeks, accompanied by Mr. W. W. Monroe, manager of the foreign department of the American company, who will spend a few weeks in Europe in getting the business of the American company thoroughly established there.

Mr. Thomas F. Rochford, who was at one time connected with the Baltimore & Ohio Company in Brooklyn, but is now interested in the Postal Telegraph Delivery Company, made certain charges lately before Commissioner Carroll, that persons connected with the Brooklyn Police Telegraphic Bureau were running wires for the Baltimore & Ohio Company. The charges were intended as a fling at Mr. Frank C. Mason, the efficient head of that department. Three times the case was set down for a hearing. On the first occasion Mr. Rochford asked for an adjournment, on the second he didn't appear at all, and neither did he do so on the third occasion, in spite of the fact that he was sent the following explicit letter:

Thomas F. Rochford, Esq.:

SIR: You are hereby notified that by reason of the absence of yourself and your witnesses the Commissioner was obliged to postpone the investigation of the charges made by you that "members of the Police Department are running wires for the Baltimore & Ohio Telegraph Company," and others of a similar character, until Monday, July 18, at 12 M. Your failure to attend at that time and place and produce evidence to sustain such charges will be regarded as a withdrawal thereof, as an abandonment of your expressed desire for an investigation, and will be deemed an admission by you that such charges are groundless and absolutely false.

By order of the Commissioner. FRANCIS L. DALLON.

Commissioner Carroll, after waiting half an hour, said it was very evident that Mr. Rochford did not want to appear, and therefore the complaint was dismissed. The charges grew out of a feeling between the opposition telegraph companies. It seems that when the Baltimore & Ohio opened an office away up in Fulton street their linemen made use of a "dead wire" for three or four days which ran over the police poles, and this was all there was in the matter.

Mayor Hewitt seems to have made up his mind not to be a dead-head in the enterprise of putting the wires of this city underground. He has not only attended all the recent meetings, but has taken an active part in the proceedings—far more active, in fact, than some of his colleagues may desire. The Board of Electrical Control—why don't they call it the switch-board at once?—is now settling down to its work. At the last meeting a request from the Consolidated Telegraph & Electrical Subway Company that it be allowed to continue its work at Broadway, Fifth avenue and Twenty-third street south to Fourteenth street and north to Thirty-fourth street was referred to Chief Engineer Kearney. A resolution fixing the compensation to be paid to the city by all companies, new and old, at 1 cent per lineal foot of subway occupied, was referred to the Mayor to examine and consult with the Corporation Counsel as to its legal aspect. Mr. Gibbens said that he had been unable to gain an opinion from an electrical engineer concerning the rules and regulations governing the erection of poles and wires as to the protection to life afforded by them, and asked for more time. Mayor Hewitt said he thought it would be a wise thing to submit the rules through the Department of Public Works to Lieut. Millis, United States Army, an electrical expert, and this suggestion was adopted by the Board. Permission was given, in general terms, to the various companies to make repairs on their existing services, and there was an interesting discussion as to the inspection of insulators, etc. Mr. J. D. Beere, of the Continental Conduit Company, asked that a public opportunity be given its system to compete with others. No action was taken on the request. W. T. H.

NEW ENGLAND NOTES.

BRANCH OFFICE OF THE ELECTRICAL WORLD,
BOSTON, July 26, 1887.

President Johnson, of the Edison Company, of New York, was on a flying visit to this city yesterday.

The board of directors elected by the stockholders of the Sun Electric Company, of Woburn, at a called meeting at Saco, Maine, July 16, consists of the following-named gentlemen: Isaac Fenno, Wm. Butterfield, Fred. A. Gilbert, N. J. Simonds, M. M. M. Slattery, Frank Ridlon and B. F. Whittemore. These gentlemen met to-day and selected as officers of the Sun Electric Company for the ensuing year, for President, William Butterfield; Manager, Frank Ridlon, and Electrician, M. M. M. Slattery.

The Bellows Falls, Vt., Electric Light Company has finished wiring the streets of the business portion of that town for incandescent lighting, and is prepared to furnish, it is said, 2,000 lights of 16 c. p. each. The Edison Municipal system is used.

The Lewiston & Auburn Electric Light Company, of Lewiston, Me., has contracted with the manufacturers of the P. C. Holmes water wheel for two wheels of 250 h. p. each.

Advices from Bennington, Vt., under date of July 21, state as follows: "This afternoon, at a special meeting, the Bennington village corporation voted nearly unanimously to illuminate the streets with electric lights, and empowered the board of trustees to carry this resolution into immediate effect."

The New England Wiring and Construction Company is busily engaged in stringing wires for the 400 light (Edison incandescent) municipal plant at Brockton, Mass. It is estimated that forty miles of wire will be used in this installation. The same company has a force of men at work putting in the wires for 500 incandescent lights (Edison) in the immense pork packing establishment of J. P. Squires, East Cambridge, Mass.

A new 125 horse-power engine was received last week at the Electric Machine and Power Works, Woonsocket, making the fifth. One of the others is a 200 horse-power, two 50 horse-power, and one 65 horse-power. The water wheel is 250 horse-power, making a total driving force of 755 horse-power. There are six boilers. There will be eighteen dynamo machines when the new works are in running order.

The New Haven Clock Company is to erect a new building in that city to be used as a store house and shipping department. This will give the company much needed room at New York and New Haven for the transaction of its rapidly increasing business.

The Holmes Burglar Alarm Telegraph system at Providence, R. I., under the management of E. M. Carhart, is undoubtedly a successful enterprise. It was inaugurated in 1881, and has at the present time 54 subscribers, consisting of some of the most prominent and wealthy business concerns in Providence. Its list embraces several manufacturing and retail jewelers, a number of the leading banks and brokers offices, and the well-known clothing house of McCullar, Parker & Company.

William V. Lockwood, Waterbury, Conn., formerly in the employ of the Bell Telephone Company of Boston, and of the Western Electric Company of New York, has invented there and placed in the service of the District Telegraph Company a new return signal.

The Jarvis Engineering Co., No. 61 Oliver street, Boston, report the following sales of the Armington & Sims engines:

New Haven Electric Co., New Haven, Conn., 2 60 h. p.
Burlington Gas-Light Co., Burlington, Mass., 3 60 h. p.
Edison Electric Illuminating Co., Brockton, Mass., 1 60 h. p.
Edison Electric Illuminating Co., Brockton, Mass., 1 125 h. p.
Nashua Electric Light Co., Nashua, N. H., 2 90 h. p.
Millbury Electric Light Co., Millbury, Mass., 1 35 h. p.
Edison United Manufacturing Co., Boston, Mass., 1 25 h. p.
Dover Electric Light Co., Dover, N. H., 1 60 h. p.
Traders Electric Light Co., Biddeford, Me., 1 90 h. p.
Natick Electric Light Co., Natick, Mass., 1 60 h. p.
Edison Electric Illuminating Co., Great Barrington, Mass., 1 80 h. p.
Sprague Electric Railway & Motor Co., Richmond, Va., 3 100 h. p.
Thomson-Houston Co., Boston, Mass., 2 125 h. p.
Thomson-Houston Co., Southbridge, Mass., 1 50 h. p.
Thomson-Houston Co., Houlton, Me., 1 60 h. p.
Newton Electric Light & Power Co., Newtonville, Mass., 2 60 h. p.
Woonsocket Electric Machine & Power Co., Woonsocket, R. I., 1 125 h. p.

Mr. James H. Howard, vice-president and general manager of the Tropical American Telephone Company, Limited, stated to me to-day that "his company will pay a dividend of 1 per cent. (or 10 cents per share) on August 15 to stockholders of record August 1." The annual meeting of the company will be held at Long Branch, New Jersey, at 10 o'clock, on Wednesday morning, July 27, for the election of officers for the ensuing year and for the transaction of other business. It is predicted by disinterested individuals familiar with the operations of the Tropical American Telephone Company that the old officers will be re-elected. While referring to this company, it might be well to state: the business for the last year shows a gain of 50 per cent. in sales over the preceding year, in spite of greater competition. The company has reduced its prices on telephones, transmitters and all telephonic supplies, so that it can increase its sales still more, and expects to continue its semi-annual dividends hereafter. W. I. B.

PHILADELPHIA NOTES.

PHILADELPHIA, July 25, 1887.

The efforts by Colonel A. L. Snowden, the marshal of the grand celebration to take place in this city on Sept. 15, in honor of the centennial anniversary of the adoption of the Federal Constitution, are being rewarded in such a way as to leave no room for doubt as to the success of the entire affair, not only as an imposing one, but suggestive and illustrative as well. The presence of nearly all the Governors of the original States, as well as nearly all of the remainder of the States and Territories has been assured, and, while their presence is very desirable, it is more important that the different commonwealths should be represented in the great industrial demonstration on that day.

In the processional display, the effort will be, so far as may be possible, to illustrate the advance we have made in the last century in the arts that tend to prosperity and peace. With this object in view, and with the desire to have a representation in the display from each of the States in the Union, Colonel Snowden, Chairman of the Committee and Marshal in charge of that important portion of the work, has opened correspondence with the Governors of the States, requesting the appointment of a committee in each State, whose duty it shall be to stimulate interest and representation from the different branches of industry.

He has also issued a circular in which he says:

"It is proposed to make the civic demonstration illustrate, as far as may be possible, our marvelous advance in the arts of peace in the last century.

"In this illustrative demonstration all sections of the country should participate. Nevertheless, it is manifest that Philadelphia must be the largest contributor in this direction. From her varied industries and wide-reaching manufacturing capabilities we must largely draw, and from past experience I know that we can confidently rely upon the patriotic spirit and earnest practical co-operation of our citizens.

"As the period for preparation is short, it is earnestly requested that all individuals, firms or corporations engaged in industrial pursuits may make speedy arrangements for active and intelligent participation in this great demonstration.

"The effort of each industry should be to give a practical ocular demonstration of the advance made within the last century under the constitution.

"Correspondence on these points, and any other that may be of interest or value, is invited."

It is to be hoped that all the various branches of the electric lighting industry and kindred pursuits will be thoroughly represented.

Communications on the subject may be addressed to either Col. Snowden, Marshal; Amos R. Little, Chairman; or Hampton L. Carson, Secretary of the Constitutional Centennial Commission, Philadelphia.

A very severe storm of thunder, lightning and rain has prevailed in this section for the past two days and has caused considerable damage. Saturday morning, a large wharf of the Pennsylvania Railroad Company at the foot of Walnut street fell in, owing to a defective sewer underneath, and the cables of the Western Union Telegraph and the Bell Telephone companies, which enter the river from the pier, were dragged out of place and broken. This stopped for a time telephonic communication

with Camden and South Jersey by the Bell system, and seriously interfered with the telegraphic service of the Western Union Company.

The Bell Telephone Company has raised its price for connections from Camden with South Jersey towns from twenty-five to thirty-five cents. To several towns this is in excess of the railroad fare.

The Director of Public Works has submitted to the Mayor the estimate of the expenses of his department for the coming year. Among the various items is one for the Electrical Bureau of $196,980.56, including $10,000 for the improvement and extension of the service. The various items are:

For rental of telephones, purchase of materials and extension of lines and hospital service, $6,200; electric lights, $104,280.50; underground electrical service, $20,000; extension of police, signal and telephone service, $10,000.

The estimated receipts of the electrical department are $16,000, mostly from pole licenses, etc.

Robert Wetherill & Co., of Chester, are turning out several of their new combination engines and dynamos. They are making them only from 4 to 6 horse-power at present, but expect to build them of any required size.

The Chester Foundry and Machine Company, of Chester, Pa., are a new concern, established more especially for the manufacture of the 3-cylinder Brotherhood engine, which is attached direct to either dynamos, fans, ship steering gear, etc. They are not yet in fair working order owing to the difficulty in obtaining necessary tools.

The Messrs. Churchman, who handle Sullivan & Co.'s new chromic acid, are without doubt two of the hardest working men in the city. If the demand for their acid continues at the present rate, and it undoubtedly will, since its strength has been greatly increased, they will be obliged to enlarge their quarters and clerical force. Chromic acid is, they believe, destined to supersede nearly every other known substance used in battery solutions as frequent and severe tests have demonstrated its superior value.

The well-known flint-glass firm of Gill & Murray, of this city has been dissolved on account of the expiration of the partnership. Mr. Gill will continue the business, and the works will be put in blast about the first or second week of August.

"It never rains, but it pours," is quite a true saying with Messrs. Shaw & Geary, and as a consequence they are to be found at their factory, not only all day, but a good part of the night. They are trying hard to turn out enough of their new Norway iron bells to supply the pressing orders, but it is hard work to do it. Beside their own business they are working on two or three large outside contracts, notably one for the Siemens Company, in which several thousand pounds of brass are to be worked up. Their bells are admirable in their simplicity and the very small amount of battery power to operate them. They have put on several new workmen recently in order to keep the work up as close as possible.

E.

WESTERN NOTES.

BRANCH OFFICE OF THE ELECTRICAL WORLD,
CHICAGO, July 23, 1887.

The past week has witnessed unusual activity in electrical circles, especially so in view of the fact that this is generally considered a dull season. Prof. Barrett, the city electrician, has been very busy perfecting the details of the bridge opening system and the electric lighting for the Chicago River. As stated in a previous letter, an appropriation was made by the City Council for carrying out Prof. Barrett's plan for facilitating the passage of vessels through the river, and thereby lessening in a measure the inconvenience and delay caused the public by long waiting at river crossings. The first test of the new system was made July 20. The bridges and tug offices are connected by telephone to an ordinary switch-board placed in a small building erected for the purpose at the foot of La Salle avenue.

When a vessel wishes to proceed, notice must be given by telephone to the vessel dispatcher, and the bridges are entirely under the control of this official. The main idea of the new plan is to hold vessels at different points until others have joined them bound for the same destination, so that vessels will pass in fleets instead of singly as heretofore. Some annoyance was caused at first by the inexperience of the bridge tenders in using the telephone, but the result justified Professor Barrett in proclaiming the system a success. The harbor master will have charge of the new plan under the supervision of the city electrician. It is expected that two operators can perform the work.

Regarding the plan to light the river I can give you no better information than is included in the following from the *Daily News:*

Professor Barrett of the fire-alarm service was asked this noon what progress he had made with his scheme for lighting the river by means of electricity.

"I can't answer you any better," said he, "than reading over the specifications for the work, which I have just completed and which have been approved by Mr. Swift, superintendent of public works. They demand, first, that the plant shall be placed in the building at the northeast corner of Clinton and Washington streets, and to be used for lighting the river and bridges from Halstead street bridge on the north branch to Halstead street bridge on the south side.

"One hundred double-carbon full-arc lamps of nominal 2,000 candle-power each are required, and all of these lamps must be weather-proof. Quarter ground globes go with these lamps. Bidders will also be required to furnish fixtures to place lamps on lamp-posts where directed and in such a manner as not to interfere with the use of posts for gas-lighting. Suitable fixtures are also demanded for suspending lamps on the viaducts. The switch-boards must be of suitable size and arranged so that the circuit from one dynamo may be changed to any other dynamo while in operation without opening the circuit, or any one dynamo may be changed from one circuit to another without opening the circuit.

"The plant has to be placed in the basement of the building, the cables must be brought from the switch-board to the street line, thence underground across Clinton street north to wall of Washington street tunnel, thence along the tunnel wall to the light-shaft, thence through the light-shaft to the dock-line elevation on both sides of the river. Cables are to be dropped into the river and suspended below frost line, so that they may be removed readily should it be found necessary in case of dredging or repairs to the line of docks. The cables are then to be brought up on the bridge abutments and protected in extra iron pipes from below frost line to at least ten feet above the sidewalk. All underground cables and those running along the wall of the tunnel must be incased in iron pipe. Where a street intervenes between one bridge or more, armored cable or insulated wire or iron pipe may be used under the sidewalk space. Bidders must furnish a sample of the cable they propose to supply, and will be required to furnish their estimate on the cost of the cable, including all labor, per mile."

In this estimate will also be included the cost of the services of an expert for at least thirty days after starting up.

One horizontal tubular boiler is likewise called for, and it must have a shell 72 inches and a length of 18 feet, to be made of steel, all the seams double-riveted, and to be supported by three wall brackets resting on iron plates and rollers, and to have one man-hole above and one man-hole below tubes in front end. It must be tested at 150 pounds per square inch. Liners, rocking grate-bars, smoke-flue to brick chimney provided with a damper, first-class fittings go with the boiler, including valves, stand-pipes and steam guage and a set of firing tools. The engine must be a first-class automatic of suitable size to develop 125 h. p. To this is added a steam-pump, an injector, a brass tube heater and the foundation on which the engine is to rest must be of substantial rubble-stone, with brick and the best cement. The foundation for the walls on which the boiler will set must be of rubble-stone 24 inches thick and 24 inches deep. The walls will be brick, 22 inches thick, with a 2-inch air space, and the furnace, bridge-wall and rear-arc is to be lined with first-closs fire-brick laid in fire-clay, and that portion under the boiler from bridge-wall, six feet from fire-front, to be set in a wrought-iron pan with angle-iron band riveted to top edge.

Finally, bidders must guarantee the amount of Hocking Valley or Pittsburgh coal that will be required per indicated horse-power per hour.

Bids for this work will be received July 30 at the office of the Commissioner of Public Works. It is believed that not more than six weeks or two months will be required to complete the job.

The Brush Electric Light Co. have closed a contract for a seventy-five arc light plant at Iron Mountain, Mich.

The Mount Vernon Electric Light and Power Co., at Mt. Vernon, Ill., has been incorporated with a capital stock of $10,000. The names of the incorporators are as follows: Allan C. Tanner, Geo. A. Evans, Morris Emerson and others.

The Western Edison Light Company have made a formal demand upon the Street Commissioner for a permit to lay conduits on both sides of all of the business streets of the city east of Franklin, south of Randolph and north of Van Buren. This proceeding has had the effect of stirring up some excitement in the City Hall, principally for the reason that many of the streets have been newly paved and torn up for building cable lines. The ordinance, however, leaves the city no discretion in the matter, and it is probable that the Edison Company will gain their point. Since the death of Mr. Holland the the Chicago Arc Light and Power Company have cut off several motors to which they were furnishing current, in order to complete the reconstruction of wires, and this action has given fresh impetus to the storage battery business.

Having expressed to Mr. Shay, of Munson & Co., a desire to see the process of manufacturing belting, I was, a day or two ago, shown through their large workshops and warerooms. The superiority of their productions is well attested by the heavy sales they have made during the last twenty years. This company is the sole owner of several valuable machines, illustrations of which have appeared in THE ELECTRICAL WORLD, and I can assure anyone dealing with them of the best of treatment upon the part of manager Thomas and his assistants. My tour of the works impressed me very much in regard to the close relation between the new applications of electricity and the highest forms of mechanical product and skill.

My correspondent at Salt Lake City, Utah, reports that the Rocky Mountain Telegraph Co.'s line has been completed and is now in operation from Salt Lake City to Butte, Montana.

Mr. R. H. Cokefair, formerly with the Central Union Telephone Co., has been appointed superintendent of the Rocky Mountain Bell Telephone Co.'s interests in Montana.

The Rocky Mountain Bell Telephone Co. will soon begin the construction of a No. 10 H. D. copper line from Salt Lake City to Payson, about sixty miles in length.

The Rocky Mountain Bell Telephone Co. has declared a dividend of one dollar per share. This company reports a gratifying increase in extra territorial business.

My San Francisco correspondent reports the incorporation of the "Rae Electrical System Co.," with one million dollars capital stock. Names of incorporators as follows: Julius Jacobs, A. P. Brayton, Julius H. Rae, Geo. C. Perkins and W. Alvord. I understand the system is for ore working.

The streets of Panama, Central America, are now brilliantly lighted by electricity.

The electric interests of Omaha are in a most flourishing condition. The telephone company have just finished setting up their new multiple switch-boards, fitted up for twelve hundred subscribers and five thousand capacity. Your readers will remember that their exchange was burned out last November.

General Manager Drake tells me that he considers his system of calling the best in use.

His subscribers have always done their own calling. Now this would not be convenient with a multiple board as ordinarily operated, so they have adopted a special clearing out drop which only signals by the action of a straight or direct current, alternating currents not affecting it. A commutator placed in the subscriber's bell enables him, by pressing a button on the side of the bell while turning the crank, to drop the clearing out annunciator. Without pressing the button he cannot, of course, get a signal to the central office. This system enables the operators to work very rapidly, while at the same time operators can attend to double the number of subscribers.

The telephone company made the change from the old to the new office in less than twenty minutes, but during that time there was not a single subscriber who could not receive service through one office or the other, consequently there was no interruption whatever. The switch-board is of mahogany and the office is furnished throughout very tastily. At one end of the operating room are a lunch room and other conveniences for the operators. At the opposite end is a large bay window in the corner of the room affording a magnificent view up and down the streets and over the buildings opposite to the valley of the river and the hills beyond.

Adjoining the operating room comes first the manager's office, next the stenographer's room, then the general manager's room, and further on the book-keeping department. The woodwork is of hard pine finished in oil, with ground glass partitions between the various departments. The whole arrangement is exceedingly convenient and compact. Beyond these rooms is a large and well lighted room for directors' meetings. They have commenced tearing down their old poles and wires, and the appearance of the streets is much improved. The cables are placed upon 50-foot poles, and in the business portion of the city wires are run down through the alleys and into the rear of the buildings, thus taking the wires as far as possible off the main streets. Altogether this is one of the model exchanges of the country, and well worth a visit.

The increased business at the Lincoln exchange will necessitate the moving of the old exchange.

The Midland Electric Company report good business.

Col. S. G. Lynch, broker, 146 La Salle street, Chicago, furnishes me the following quotations upon telephone stock:

	C. H. M.
Bell of Mo	$155@$157
Central Union	45@ 46
Chicago	385@ 400
Colorado	20@ 22
Cumberland	80@ 85
Great Southern	30@ 33
Iowa Union	25@ 27
Michigan	76@ 77
Rocky Mountain Bell	40@ 45
Wisconsin	105@ 107

SIOUX FALLS, Dakota, July 13, 1887.

The Sioux Falls Electric Light and Power Company was organized some time in 1883, and in the spring of 1884 it put up a building in the northern part of the town, installing a 30 light Van Depoele arc plant. For various reasons the company did not prove a very brilliant financial success, but its plant has nevertheless been kept in continuous operation down to date, with the exception of two months last summer. As Sioux Falls is already a city of 8,000 people, with as bright a prospect as any place of its size in the Northwest, its ambition could not very well be satisfied with a 30-light arc plant and gas works to supply light, and the most recent stage of affairs is, that the Cascade Milling Company, which owns a valuable water-power right in the heart of the city, decided this spring to add electric lighting to its milling business. It has bought from the Sioux Falls Company its engines, dynamos, lamps, poles, wire, etc., and has also ordered from the Western Edison Company a 500-light outfit to begin with. A number of men in the employ of Messrs. Leonard & Izard, of Chicago, are now at work on the inside wiring for over 300 Edison lights. The pole line will be completed in a few days. Nothing but well selected 40 and 50 feet poles are being used, and Sioux Falls will be able to boast of a pole line that has few equals and no superior. The circuit for arc lights is also being reconstructed, and there will be a regular arc service for street lighting. The dynamos are to be placed in the new engine room now nearing completion; it is 35 feet by 50, and the boiler room is 20 by 40, built from foundation to roof of Sioux Falls jasper. The engine room is so located in regard to the mill as to allow the water-wheel shaft to drive the dynamos under ordinary conditions, and in case of low water the steam power can be used in the mill and the dynamo room alike. It is expected to have the plant in full operation by Sept. 1. The Cascade Milling Company is composed of I. Emerson, E. A. Sherman and G. Wheeler. Mr. O. Ericsson is manager of the station.

SOUTH AMERICAN NOTES.

COQUIMBO, Chili, June 30, 1887.

The construction of the first Edison three-wire central station in South America was commenced in the city of Coquimbo, Chili, the American and English naval port of the Pacific, in October, 1886. Soon after the work was fairly under way, cholera appeared in the central provinces of Chili, and yellow fever broke out in Ecuador. The result was a complete blockade of all communication, even fumigated bags of mail being refused, while all ships were sent to sea at the point of a cannon. The result was that the little central station of 640 lamps did not get into operation until April 7 last, since which time it has given the greatest satisfaction. This town has less than 5,000 inhabitants, but boasts of a perfect city water supply, a very good police force, handsome hospital, public library, American church and college and well paved streets. The electric light is very popular, and is used for both street and house illumination, many of the latter being fitted up in the most handsome manner, with costly electroliers. The plant is now to be doubled in capacity, as it started on a dividend-paying basis.

THE TELEGRAPH.

Western Union Earnings are said to be good just now, and to equal 7 per cent. on the stock.

Six-cent Telegrams.—An agitation has now been started in England for three-penny telegrams. It hardly seems likely that the reduction will be made just yet, as it is only recently that the six-penny rate was adopted.

Telegraph Earnings.—The earnings of the Mexican Telegraph Company for the week ending July 16 were $4,027 and those of the Central & South American Company $5,861. The cable on the west coast, south of Peru, was interrupted from the 14th to the 19th.

Old Timers' Reunion.—Mr. W. J. Dealy, secretary of the Old Timers' Association and Mr. J. E. Pettit, secretary of the U

S. Military Telegraph Corps, announce that the seventh reunion will take place at the Hotel Lafayette, Philadelphia, on August 17 and 18. The opening meeting on the 17th will take place in the Common Council Chamber over Independence Hall. The members will be received by Mr. Wm. B. Wilson and addresses will be made by Messrs. Plum, Hine and David Brooks. The 18th will be devoted to excursions and to a banquet at the Union League Club House.

Cable Dividend.—A London dispatch says that the directors of the Direct United States Cable Company have resolved to recommend a final dividend of 2 per cent. per share, free of income tax, payable on and after July 30, making, with the interim dividend already paid, 2 per cent. for the year ending June 30.

A Big Cable Order.—The London *Electrical Review* understands that the Telegraph Construction and Maintenance Company is manufacturing two thousand miles of submarine cable, and says: "We hear also that it is to triplicate a line which has already two cables in working order, so our readers can amuse themselves by guessing the ultimate destination."

A Pacific Cable Wanted.—At a meeting of the members of the San Francisco Chamber of Commerce, on July 19, the following resolution was unanimously adopted: *Whereas*, Political and commercial relations of the United States with the Hawaiian Islands, the South Pacific Islands, and Australia are rapidly increasing; and, whereas, the laying of a telegraph cable on this ocean route is accompanied with grave financial and scientific questions, which will prevent the use of exclusively private capital therein, therefore be it *Resolved*, That the Chamber of Commerce of San Francisco forward to the ensuing Congress a memorial earnestly petitioning our Government to offer such inducements that capital may be attracted to this great enterprise, to the commercial and political advantage of the whole country.

Against Mr. Stokes.—Judge Barrett has decided the celebrated suit of Townsend Cox and Townsend Cox, Jr., against Edward S. Stokes, the Reorganization Committee of the Bankers & Merchants' Telegraph Company and others, in favor of the plaintiffs on most of the points. In this suit the Messrs. Cox, who are holders of $731,000 of mortgage bonds of the Bankers & Merchants', complained that the Reorganization Committee had been false to its trust and had played into Mr. Stokes' hands in regard to the sale of the Bankers & Merchants' property, July 31, 1885, when it was bid off by Mr. Stokes for $500,000. They claimed that the property was worth $2,500,000 at least, and that Stokes had no right to it by the sale except as the agent of the bondholders. Judge Barrett takes this view. The arguments, when the case was heard by Judge Barrett last May, were very acrimonious, and Colonel Ingersoll, who represented Mr. Stokes, and W. D. Guthrie, who appeared for the Messrs. Cox, had a bitter personal controversy. It is said that the case will now be appealed.

Licenses for Telegraphers.—A movement of importance to the traveling public is now on foot. About a year ago the railroad telegraphers formed an organization of their own, and since that time the order has grown both East and West. At the coming session of Congress they intend to promote a bill making it a penal offense for any railroad company to employ a telegraph operator who directs the movements of passenger-trains who has not been granted a license. Licenses will be issued by the Government, the applicant being required to pass a practical examination, to produce evidence as to moral character and habits, and to be of proper age. The leaders in this movement say that as Congress has the power to regulate inter-state commerce, it has the power to issue these licenses, the same as it now says who shall command a vessel on navigable waters or who shall hold a mate or engineer's certificate. The operators claim that despite the responsibility attaching to their occupation, mere boys and young girls without experience are put in responsible positions, and that this license system would correct that evil. Often when accidents have occurred they are blamed for them and made to suffer, when in reality the responsibility is not theirs, and under the license system in such a case they could appeal to the United States officials. It is not, they say, a combination to affect wages. If the scheme is successful an effort will be made to have the licenses issued by the Inter-state Commerce Commission. The order of Railroad Telegraphers, as it is called, was organized at La Porte City, Ia.

THE TELEPHONE.

Tropical.—The Tropical American Telephone Company has declared a dividend of 1 per cent. Ten cents per share on all stock of record Aug. 1, payable Aug. 15.

Lowell, Mass.—A jeweler at Lowell has been arrested under a charge of tapping the local telephone wires, and making use of them for the purpose of running some independent telephones which he had hired out.

Another Victory for the Bell Company.—Judge Wallace has handed down a decision in the U. S. Circuit Court, in this city, in favor of the American Bell Company against the Globe Telephone Company, for infringement. The Globe Company represented the well-known Meucci and Bassano-Slater interests, and has never done any practical commercial work.

Long Distance Work in New England.—Speaking of long distance telephony, the Springfield *Republican* says: "About 12 towns are included in the line from Philadelphia to New York, and the wires pass through the metropolis by underground cables, which are brought into the new telephone building at 18 Cortlandt street, which is used as the central exchange. From New York the line passes to Katonah, 35 miles away, and easterly to New Haven. From New Haven it passes through North Haven, Wallingford, Meriden, Berlin, New Britton, West Hartford, Bloomfield, East Granby and Suffield. Work will begin in Agawam this week, and the West Springfield selectmen will meet the officers of the company to-morrow to locate the line through that town. Loops will be run out to towns near the route wanting the service, and Hartford has already been included in this way. A right of way has been purchased along the Central Massachusetts Railroad to Boston, and the posts have already been laid and the wires strung to Amherst."

THE ELECTRIC LIGHT.

Paris.—The new Opera Comique in Paris is to have an Edison installation.

Greenville, S. C.—A Brush plant is to be added to the gas works of R. R. Asbury & Son.

Silk Mills.—The Leonard Silk Company, Warehouse Point, Conn., will light their mill by electricity.

Richmond, Va.—An increase will be made in the plant of the Excelsior Electric Light and Power Company.

Easton, Pa.—The American Illuminating Company, of Easton, Pa., has been incorporated with a capital stock of $5,000.

Berlin.—The Central Edison Station, under the management of the city, will, it is stated, be increased so as to furnish current for 40,000 lights.

New Britain, Conn.—The Electric Lighting Company of New Britain has finally closed a contract for putting in a plant of the Edison system.

Chicago.—One of the Chicago "boodle" aldermen, turned informer, swears that he got $700 or $800 for his vote on the local electric lighting contract.

Greensboro, N. C.—The local authorities of Greensboro contemplate putting in an electric plant. The Board of Aldermen can be addressed on the subject.

Webster, Mass.—The new Electric Light Company at Webster is using the Thomson-Houston system, arc and incandescent. Its incandescent service will be run by alternating machines.

The Fire at Newark.—The "proof of loss" on buildings and contents destroyed at the late fire at the United States Electric Light Company's works, Newark, N. J., amounts to $162,213.05.

Bellows Falls, Vt.—The Bellows Falls Electric Light Company is encircling the business portion of the square with its main line wire, and is prepared to furnish 2,000 incandescent lights outside the mills.

Philadelphia.—A Philadelphia dispatch says that the Edison Electric Light Company, of that city, has made a favorable lease for use of the conduit being laid and to be laid by the Pennsylvania Electric Light Company.

Toledo, Spain.—The municipal authorities of Toledo, Spain are adopting the electric light, and invite proposals within a period of 45 days from June 30. Steps are also being taken to instal the electric light at Pontevedra.

Naples, Italy.—Local authorities in Italy are following the example of those in France and Belgium in ordering the use of electric lights in theatres. At Naples the municipal council has now made the use of electric lights compulsory.

Fort Scott, Kan.—The Fort Scott Consolidated Electric Light Company is now running three 60-light Sperry machines for street and store service. Its rates are $10 per month for 12 o'clock lights, or $100 a year for lights until 9:30.

A Night Light.—"What is the great need of the hour?" exclaimed a lecturer on "The Amelioration of the Evils of Humanity." To which an inebriated auditor replied: "A ni-night key with an e-e-lectric li-light on the end of it."—*Scranton Truth.*

Train Lighting in Germany.—A train of 6 cars is running between Darmstadt and Heidelberg on the Main-Neckar road lighted by accumulators of the Khotinsky type. Each carriage carries two batteries of 8 cells. One battery is in use while the other is charged by a dynamo placed in the guard's van.

Belgium.—A central station for electric lighting has been established at Berchem-Antwerp, by the Société Industrielle de l'Electricité of Brussels. The alternating current system has been adopted for the purpose, and it is said that some of the lighting is done at a distance of 2½ miles from the station.

Atlantic City, N. J., is now being lighted with the American system. A company was organized which is composed of some of the best business men of Atlantic City, and a 50-light American plant is installed there. This has given such satisfaction that an increase of 50 lights has been ordered, making the plant 100 lights.

Racine, Wis.—The Racine Gas Light Company has put in a hundred 2,000 c. p. arc lights, and expects to begin lighting Nov. 1. The rates will be $75 per light for all night lighting, and $50 per light till midnight per annum for the city. The rate for commercial lighting will be $8 per month till midnight. Mr. John Rodgers is superintendent.

The Electric Light Industry in England.—Mr. Hugh Watt, in a resolution which he proposed to move, brought before the House of Commons the statistics of electric lighting in America as one reason why electric lighting in England should be freed from the fetters, in legislation, whose effects have proved of so disastrous a character.

Randleman, N. C.—The Randleman Manufacturing Company have made a contract for a 300 light incandescent Brush plant, for their plaid mill. It is to be running by September 1, and will be employed in lighting the carding and spinning rooms, the dye house, the baleing house, and the offices. Mr. J. H. Ferree is the treasurer of the company.

Rochester, N. Y.—The Edison Electric Illuminating Company, of Rochester, is increasing its power plant. It has ordered of the Woodbury Engine Company one of the new high-speed automatic engines, 16 × 20, to run at 200 revolutions, and two additional boilers of the stationary tubular style, 150 horse-power each, making eight such in all in that station.

Pembroke, Ont.—The electric light plant at Pembroke, Ont., is the private property of Mr. W. B. McAllister. It is run by water power. It comprises two 20-light United States dynamos. These are used for street and store lighting at the rate of $75 per annum for each light. Mr. McAllister purposes putting in 250 incandescent lamps, and running mixed circuits next season.

Houlton, Me.—The electric light plant recently put in at Houlton by the Thomsom-Houston Company will be furnished with power and attendance at the pumping station of the Houlton Water Company under contract; 60 arc lights or their equivalents are to be furnished. The work of preparation is now being actively pushed, and it is intended to have the plant start by August 1. The incandescent lights are to be run off the arc circuit.

Copenhagen, Denmark.—The city authorities of Copenhagen have decided to give franchises for electric lighting; one of the conditions being that each company shall have a central station, with engines of at least 150 h. p. One of the concessions will include the lighting of the great International Industrial Exhibition, to be held in the city next year. Another provides for the lighting of the finest streets and squares. The city owns the gas works.

Geneva, N. Y.—The Brush Electric Light Company, of Geneva, have completed arrangements for erecting their new building on the shore of Seneca Lake, and have awarded the contracts. The Ball Engine Company, of Erie, Pa., will supply the new engines, boilers, etc. When completed the company will have one of the best equipped stations in the State, and all the power necessary to furnish both public and private lights in as large a number as may be required. The building will be 40 by 100 feet and one story high.

An Industry To Be Fostered.—At the recent annual meeting of the British Gas Institute, the president, Mr. W. Foulis, M. I. C. E., the Engineer-in-Chief of the Glasgow Corporation Gas Commissioners, expressed his opinion that electric lighting had done much to improve gas lighting. Their duty, he said, was not in any way to impede the development of electric lighting, but rather to render it every assistance, while, at the same time, they strove to cheapen and improve the mode of lighting in which they were more immediately interested.

Stillwater, Minn.—Not long since a company was proposed for the purpose of putting in an electric light plant at Stillwater, but that plan has been abandoned. Mr. J. H. Woolsey of St. Paul, Minn., now intends to form a company under a contract he has with the city to put in a United States plant of 204 lights of 25 c. p. each. The company will probably put in a 1,000 light plant, and reach out for commercial lighting. There is said to be a good opening at Stillwater for a plant of at least 1,500 to 2,000 lights. Measures are now being actively taken to complete arrangements.

Lincoln, England.—One of the notable electric illuminations for the Jubilee was that at Lincoln, where the great tower of the cathedral, 271 feet high, was illuminated by 32 arc lamps of 2,000 candle-power each, making the total of 64,000 candle-power. Each one of the four pinnacles bore a lamp at a height of 40 feet above the tower. As Lincoln Cathedral stands on a hill about 300 feet high, and is surrounded by level country in every direction, the light was visible at a great distance, as far north as Doncaster and York, westward well into the midland counties, and southward as far as Boston, Peterborough and Ely. The installation was put in by Messrs. Robey & Company, of Lincoln.

Grand Island, Neb.—The Grand Island Light and Fuel Company, formerly the Sperry Electric Light and Power Company, has been running two 20 light Sperry machines, charging $10 per month for the 10 o'clock circuits, $12.50 to $15 for the 12 o'clock, and $18 to $20 for the all-night, according to the number of lights used. The plant is about to be moved to the gas works, now in course of construction, and to be ready in about four or five weeks. These works are being built by the United Coal and Oil Gas Company of New York, which has consolidated with the old local Sperry Company, under whose charter the new work is being done.

Electric Lights vs. Gas.—A meeting of the residents of Commerfordville was held on Sunday afternoon at Commerford Hall, to protest against the removal of the electric light on the corner of Twenty-sixth and Church streets, and to petition the Board of Supervisors to supply another light at the corner of Twenty-ninth and Castro streets. Resolutions were adopted denouncing Gas Inspector McCarthy for recommending that no electric lights be put up where there are gas lamps, and declaring that the movement to prevent a double system of lighting in various portions of the city is in the interest of the gas company. Charles E. Myers, Daniel Ward, Michael Tierney and Joseph Sherer were appointed a committee to present the resolutions to the Board of Supervisors at its next meeting, and Messrs. Myers, Turner and Murphy were appointed a committee to specially petition the board for an additional light at the corner of Twenty-ninth and Castro streets.—*San Francisco Bulletin.*

Harlem, N. Y.—The Harlem Lighting Company, at 242 and 244 East 122d street, is giving very good service from all accounts. It has a handsome station and makes remarkably satisfactory reports as to the Waterhouse system, which it is using. It has 9 circuits now established, of a total length of about 20 miles, the longest being about 4 miles. Nine dynamos are installed, and over 200 lights are now being supplied. The lights make an excellent show on the streets, and are evidently of high candle-power. In the station a Waterhouse motor is running a ventilator. The steam plant consists of three 100 h. p. Zell boilers, a Ball engine of 80 h. p. and a Butterick engine of 125 h. p., belting up to the dynamo room, and driving on a central main shaft—just above the floor—from which the dynamos belt right and left. Frisbie friction clutches are used. Mr. A. L. Soulard is president of the company, Mr. J. Hapgood vice-president, Mr. E. F. Ames secretary and treasurer, and Mr. D. Decker superintendent.

APPLICATIONS OF POWER.

Los Angeles, Cal.—An electric railway is to be built around Elsinore Lake, at Elsinore, Los Angeles County.

The Sprague Car now building at the Sprague factory in this city for Boston, will have Julien batteries as its storage equipment.

Hutchinson, Kan.—The city authorities are reported to object to the setting up of a pole line for electric railway purposes.

Mansfield, O.—The Mansfield Electric Street Railway Company are expecting to receive this week two of their Daft cars complete. The other cars are to be "assembled" at Mansfield,

whither the various parts parts will be shipped, and the service will begin, it is said, about August 1.

Port Huron, Mich.—The Excelsior Light Company, of Port Huron, is about to put some Thomson-Houston motors on its circuits.

Elizabeth, N. J.—It is reported that Elizabeth, N. J., is to have an electric railway to run from the Union Depot to Staten Island Sound.

Rochester, N. Y.—The Rochester Electric Railway Company has been incorporated by A. S. Soule and others with a capital stock of $75,000.

Lynchburg, Va.—The Lynchburg Street Railway Company has been increasing its line and its facilities, and looking into the subject of electric motors.

Madison, Wis.—It is rumored that the Madison Street Railway Company is likely to change hands in the near future, and that electric motors will be adopted.

Los Angeles, Cal.—It is said that a contract was made recently for the construction of an electric railway from Los Angeles to Pasadena, to be finished by November.

Shamokin, Pa.—The Edison Electric Illuminating Company, of Shamokin, has two Sprague ⅓ h. p. motors on its incandescent circuits, employed in washing bottles at 75 cents per month.

Cincinnati, O., is to have an electric street railroad soon. Promoters of different systems are on the ground with their apparatus. The people are very anxious that electricity be given a trial.

Johnstown, Pa.—The Johnstown Electric Light Company has put on its Edison incandescent circuits a 5 h. p. Sprague motor for driving an exhaust fan, and a 3 h. p. Sprague to drive a circular saw.

Washington, D. C., is manifesting an active spirit of inquiry as to electric railways, and from what we know of movements in one or two quarters we shall not be surprised if electricity is soon adopted.

Wooster, O.—A number of leading citizens of Wooster propose to build an electric railway in that town, and have petitioned the city council for the right to construct and operate the road on the principal avenues and streets.

Ryde Pier, England.—The electric railway on Ryde Pier, Isle of Wight, continues in most successful operation, and the directors are now about to light the carriages with incandescent lamps, which will be fed from the main current.

The Escurial, Spain.—An arc plant has now been put in the celebrated palace and monastery known as the Escurial. In the chapel there are eight arcs of 4,000 candle power each and eight more have been put on top of the tallest tower.

Eau Claire, Wis.—The Eau Claire Brush Electric Company is putting motors on its arc circuits to run printing presses. It has had all its dynamos fully loaded with lamps, but is adding to its generating plant for the new work of lighting and power.

Greeley, Col.—The Greeley Electric Light Company is putting in a 1 h. p. Sprague motor on its incandescent circuit for the purpose of pumping water from an artesian well at a depth of 200 feet. The company has agreed to pump the water at the rate of 2 cents per barrel.

Fort Smith, Ark.—A syndicate contemplates building a line of street railway about 2½ miles in length, and a survey of the route is now being made. It is possible that the parties may build for a longer distance, and, if so, will probably put in a steam or electric motor. Mr. G. Tilles, who is prominently interested, intends coming East as soon as surveys are made for the purpose of making contracts, etc., for material.

Middleboro, Mass.—Dr. Charles Copeland, J. B. Ryder and other prominent citizens are understood to be engaged in working up a street railway enterprise. A railway one and one-half miles in extent, from the railroad station to the Star mills, is proposed, and the prospect of its being soon built is believed to be good. It will require a capital of upward of $30,000. The opportunity to use electricity is excellent.

Laramie, Wyo.—The Laramie Electric, Gas Light and Fuel Company is about to establish a day circuit for the supply of power by electric motor. It will furnish 40 h. p. in one lot, besides other work. It uses the Edison system, 110 and 220 volts. The 40 h. p. mentioned is for a flouring mill, 150 feet away from the station, and $260 per month will be charged for that amount of power, on the basis of 26 days of 10 hours to the month.

Brush Motors in Demand.—During the short time that the Brush Electric Company have been shipping motors, they have sold about 1,000 h. p. Many of the motors have gone abroad, and orders, both domestic and foreign, are pouring in rapidly. The company have yet to receive a bad report from any of their series motors, which are performing all sorts of service admirably. The motors range chiefly in the larger sizes, the majority being from 2 to 15 h. p.

Woonsocket, R. I.—The Woonsocket Electric Machine and Power Company has lately paid considerable attention to the motor business. It now has in use on its incandescent circuits one 7½ h. p., one 5 h. p. and two 1 h. p. Thomson-Houston motors, and two 7½ h. p., two 5 h. p., one 3 h. p., two ⅓ h. p., and one 15 h. p. Sprague motors. These motors are at work in machine shops, press rooms, bake shops, wood-working shops, laundries, etc., and give general satisfaction.

Admirably Adapted to the Printing Offices.—Electric motors are coming into use in small offices to drive presses, and seem admirably adapted to this purpose. They require no care, and are always ready, at the same time giving out no heat. The Ericsson motor, which was once used largely for this purpose, is now discarded almost entirely, there sometimes being an uncertainty about its action, which prevented work being done when it was most needed.—*American Bookmaker.*

Williamsport, Pa.—The Edison Electric Illuminating Company, of Williamsport, has put on its circuits recently one 10 h. p., two 5 h. p., three 3 h. p. and four ⅓ h. p. Sprague motors, and three ⅓ h. p. C. & C. motors. These are, of course, all on incandescent circuits. They are running printing presses, circular saws and other wood-working machinery, elevators, plating works, sewing machines, water pumps, ventilating fans, etc., and earn about $100 a year per horse-power for city work. They give very general satisfaction.

Lawrence, Mass.—The Edison Electric Illuminating Company, Lawrence, has already several motors on its incandescent circuits—one 6 h. p., three 3 h. p., three 2 h. p., and seven of ⅓ h. p. Sprague; five of 4 h. p. Edison, and one of ⅓ h. p. Cleveland. These motors are employed on elevators, printing presses dental lathes, ice cream freezers, horse clips, fans, blowers, etc. Some of them are contracted for at about $125 per year per horse-power, and others are used by meter at regular light rates. They give general satisfaction, and the demand for them is growing.

Elgin, Ill.—The Elgin Edison Electric Light Company makes its day run with power from water-wheels, and has a number of motors on its circuits, including one 5 h. p., three 1½ h. p., and nine ⅓ h. p. Sprague, and one ½ h. p. and three ⅒ h. p. Bergmann. These are employed in newspaper offices, shoe factory, sausage factory and laundry, and in ice-cream freezing, grain elevating, coffee grinding and the operation of ventilating fans. The rates are $60 per year per h. p. from 7 A. M. to 6 P. M., and 15 cents per h. p. hour for evening hours, or the equivalent.

Fall River, Mass.—Among the small industries of Fall River, the Edison Light Illuminating Company of that place has found employment for several small motors. It has already placed on its circuits two 3 h. p., two 2 h. p., one 7½ h. p. and three ⅓ h. p. Sprague motors, as well as one ⅓ h. p. and two ⅛ h. p. C. & C. motors. These are at work on printing presses, circular saws, cream freezers, exhaust fans, dental lathes, passenger elevators, turning lathes and coffee mills. They earn about $100 per year per horse-power. There are prospects of a large increase in the service, as people are immensely pleased with the motors.

Port Huron, Mich.—"Thy country shall be my country," the Port Huron Electric Railway Co. seem to say to the immense reservoir of natural gas that underlies the city of Port Huron and surrounding country. The electric railway now extends nearly four miles; the electric force which propels the cars most elegantly, and at any desired speed, is generated by machinery propelled by steam furnished by boilers, heated by liquid fuel direct from the bowels of the earth, viz., natural gas. The travel on this electric railway is very large; thousands are wafted thereby daily to the beaches on Lake Huron for pleasure and recreation. —*Street Railway Gazette.*

A Busy Factory.—The Daft Electric Light Company's factory is extremely busy filling orders. There are at present building five 35 h. p. motors for Pittsburgh and 13 motor cars of about 15 h. p. each for Asbury Park, N. J., and Mansfield, O. The company is also doing well with stationary motors for its Spruce street power station, where three 50 h. p. generators working in parallel distribute about 150 h. p. on the east side of Broadway, from Wall street to the Bridge, to about 60 customers. Seventeen new orders for motors await attention in that district, and a new station is to be established on the west side of Broadway, starting with a circuit fed by two 50 h. p. generators.

A Fair Chance Wanted.—In the course of a recent reply to an article in a contemporary, Mr. Robert Blackwell, of the Bentley-Knight Company, said very forcibly: Electricity *is* ready to do the work, and it can to-day demonstrate its superiority over any other known power for the service in question. When the street railway men of the country give it a fair chance, treat the offers made as business propositions, and do not condemn it unseen, simply on the ground of novelty, electric tramways will become an established fact—certainly not before. The rustic in *Punch*, whose first idea on meeting a stranger was to fling half a brick at him, fairly exemplified in his demeanor the amount of courteous consideration extended, even in this progressive age, to a new idea.

Detroit, Mich.—The Edison Illuminating Company, of Detroit, has gone very heartily into the motor business. It now has 20 Sprague motors in service ranging from ⅓ up to 15 h. p. All are giving excellent satisfaction. The 15 h. p. motor is running machinery that employs 200 persons. All are on incandescent circuits, in machine shops, knitting works, printing offices, etc. As was mentioned recently, one of these motors prints the Detroit *Tribune*, a large and enterprising daily. About $100 per h. p. per year is charged, each customer buying his motor. Although the service was begun less than 90 days ago, Mr. J. R. McLaughlin, secretary and manager, reports that the company has already sold 75 h. p., and is daily receiving applications for more. Some of the testimonials from consumers are most striking.

Des Moines, Ia.—The Des Moines Edison Light and Power Company was one of the first to pay special attention to the motor business. It now has in use one 5 h. p., two 3 h. p., two ⅓ h. p. Sprague motors; two 3 h. p. Hawkeye, one 2 h. p. and one 1 h. p. Van Depoele, one 1 h. p. and one ¼ h. p. Cleveland, six 1-5 h. p. Bergmann, and one ⅛ h. p. C. & C. The list certainly presents a pleasing variety. The motors are on incandescent circuits, and are running elevators, ventilating fans, printing presses, pumps, sewing machines, lathes, etc., at the rate of $100 per year per h. p. for 10 hours a day, with work at constant load. The company has a station capacity, by the way, of 3,200 10 c. p. lamps, and has connected up 5,721 lamps. All the light is sold by meter, which the company considers by far the better way. The motors give as much satisfaction as the lights, and the company will soon have to enlarge its station. It now has under consideration the placing of three large motors, one of 15 h. p., one of 25 h. p., and one of 10 h. p. Mr. H. St. Clair Vance is superintendent of the station.

San Francisco, Cal.—There are being constructed in a machine shop on Stevenson street, near First, two passenger dummies, for the North Beach & Mission Railroad Company. These dummies are to be used on Folsom street, between Twenty-second and Twenty-sixth streets, and are to be run by electricity. The Telpherage Electric Railway Company is constructing the works on the Speed-Jenkin series system, and Professor N. S. Keith, inventor and manufacturer of electric motors, is supervising the work. F. M. Speed is the general manager and has charge of the construction and management of the road over which the cars will run. Each of the dummies will carry twenty passengers and weigh 2,100 pounds. They are entirely open, having no tops or sides. The engineer's position is between the seats, which are arranged back to back, as is the case in dummies in general use. The engines and dynamos will be located at the corner of Folsom and Nineteenth streets. There will be no change made in the old tracks. The conduit, which is now nearly finished, runs between the tracks, in the centre, and it is confidently expected that the workings of the system will demonstrate its adaptability for street railroad purposes.—*San Francisco Chronicle.*

PERSONALS.

Mr. Schuyler Duryee, for some four years past chief clerk in the U. S. Patent Office, has resigned.

Mr. T. A. Edison.—Report has it that Mr. Edison "is working on an invention by which street cars can be propelled by electricity without any elaborate apparatus along the streets."

Dr. Werner Siemens has been appointed one of the curators of the new Physical Imperial Institute, which is to be opened at Berlin next year. Dr. Helmholtz will be president of the board of curators.

Prof. E. L. Nichols, Ph.D., of the University of Kansas, has been appointed by the executive committee of Cornell University to the chair of physics, rendered vacant by the resignation of Prof. Anthony.

Mr. John B. Kitching, an old New York merchant of English birth, died last week, in this city, aged 74. He gave substantial support to the telegraph and the ocean cable in their earliest days, and was one of the first to support Capt. Ericsson, whose engine he assisted to develop.

Mr. T. Reeve Rosebrugh, son of Dr. Rosebrugh, the oculist, who is well known to electricians in Canada and this country, has just graduated with honors at the Toronto University. He is engaged with Mr. W. M. Goodwin, with the "Telephonic Telegraph," or "Way Telegraph," on the Grand Trunk Railway.

Mr. Rankin Kennedy.—It is reported that Mr. Rankin Kennedy, who has made a specialty of this field, is about to publish a work on the subject of distribution by alternating currents and transformers. The work will be based on the interesting articles contributed by Mr. Kennedy to the London *Electrical Review*, and quoted by us not long since.

SPARKS AND FLASHES.

Extract of Potato Bug.—Electricity has been extracted from the potato bug, and it is now hoped that the insect may enter upon a new career of usefulness.—*Ex.*

A Relief.—Blobson—What makes you look so cheerful to-day, Dumpsey?

Dumpsey—My daughter left the window open during the thunderstorm yesterday, and our piano was struck by lightning. You can't imagine what a relief it was.—*Burlington Free Press.*

Why It Failed.—It is claimed now that the telephone was invented in 1635 It did not come into general use, however, because the word "hello" was not invented until some years after. If you will just try it a few times you will understand why it was utterly impossible to run the telephone by saying, "Prithee, friend," or "Odds boddikins, man," or "Give thee good morning, sirrah." No wonder the telephone was a failure.—*Burdette.*

MISCELLANEOUS NOTES.

The Elektron Manufacturing Company, of Brooklyn, has been incorporated in New York State by J. A. Barrett, W. D. Sargent and others, with a capital stock of $100,000.

Wire Supply.—It is understood that the wire department of the Edison Machine Works is about to open an office in New York, where it will give special attention to its growing trade in this line.

Underground Wire.—The Union Electric Underground Company will, it is said, establish a factory in Pittsburgh for the manufacture of underground wire. Employment for 300 men will be afforded.

Anti-Magnetic Shields.—Some time ago we mentioned that the Wabash road had issued instructions for all its men to carry anti-magnetic shields on their watches. The Chicago & Northwestern road has now issued orders to a like effect.

Dynamite Struck by Lightning.—At Streator, Ill., on July 21, a powder magazine containing 50,000 pounds of gunpowder and a car-load of dynamite was struck by lightning. About a hundred houses were wrecked, one person was killed and thirty-five were injured. The accident occurred at 2:25 A. M.

The Cowles Smelting Process.—The general offices of the Cowles Aluminum and Smelting Company have been removed from Cleveland, O., to Lockport, N. Y., where the works are situated. This step has been taken in order to facilitate business, it being found desirable to have the various departments as close together as possible.

Westfield, Mass.—An attempt is being made in Westfield, Mass., to devise a system of fire alarms so that the whistle on the electric company's building can sound the district of the town in which the fire is, and thus save in many cases valuable time. It is proposed to make four or five districts, and in time place electric alarm boxes in each of them.

Lightning Strokes.—It is suggested by the *Live Stock Journal* that the apparent increase in the number of fatal accidents by lightning, where live stock is concerned, is due to the increased use of wire fencing. The frequency of such cases suggests that the vicinity of the fence is as dangerous in a thunder storm as proximity to trees or a haystack.

Sending a District Boy to Europe.—Mr. E. H. Sothern and Mr. Daniel Frohman have engaged a district messenger boy to go to England per "Germanic," with compliments and souvenirs of "The Highest Bidder" for a number of theatrical folk

and critics in London. The boy is to return by the same steamer, leaving Liverpool on August 10. It is said that the gentlemen sending the messenger on this unique errand have not yet decided whether to pay 30 cents an hour for him or to buy him outright.

Argentine Republic.—The Province of Cordoba has established a meteorological service. Prof. Oscar Doering will be in charge. It will be independent of the national meteorological office. The officers of telegraph and telephone stations will be obliged to make observations in conformity with the instructions. The work will be begun next year on forty stations.

An Electrical Spring.—It is reported by the newspapers of Pennsylvania that there is a remarkable electrical spring at Sizer ville, Cameron County. A party of Williamsport capitalists have leased it and will proceed to make a popular resort of it. In evidence of its alleged electrical or magnetic properties, it is stated that if a knife has been dipped in it the bla'e will, when with drawn, pick up tacks and other metallic substances.

The American Institute of Electrical Engineers.—Nearly $5,000 has been subscribed to the House Fund of the American Institute of Electrical Engineers. The object is to build in New York a house for the Institute, and in other ways to place the American Institute of Electrical Engineers on a firm and enduring basis. All lovers of electrical science will be glad to learn of this movement and aid it with their countenance and material support. The Institute has been the means of advancing electrical science in America in the past, and when placed in the new position sought for it it will be of still greater use as a means to promote the good cause.—*Canadian Budget.*

A Brooklyn Meteorite.—A meteorite fell in Brooklyn during the storm last week. The substance is of a bright vivid green and porous. When first procured it was soft and plastic, taking the impress of the fingers. After remaining over a day it became brittle and friable. It resembles precisely in appearance the green deposit left on a battery. At first it was thought that the lightning had struck a copper wire or roof, had melted portions of it, and, oxidizing it, had carried it to a great distance. Analysis showed its probable meteoric source, as it gave with the reagents and the blowpipe unmistakable evidence of the presence of cobalt and nickel, which twin metals are always found in meteorites. There were no traces of copper, and faint indications of iron. From the quantity of the material it is thought that the ball when intact must have weighed 20 pounds. Porticns have been sent to the Smithsonian Institution.

BUSINESS NOTICES.

Jordan & Gottfried, 208 Canal St., N. Y., carry a complete stock of iron and brass machine and wood screws, bolts, cap and set screws, taps, dies, files, twist drills, brass and rubber in tubing, rod and sheet copper, brass, German silver, steel and iron wire, shafting, tools, etc.

Big Turbines.—The Methuen Company, Methuen, Mass., have placed an order with the Stilwell & Bierce Manufacturing Company, Dayton, O., for a pair of their 25 feet horizontal Victor wheels to develop 400 h. p. These wheels displace an overshot wheel, 38 feet diam, 14 feet fan. A number of the wheels are going into some of the best mills in New England. They are remarkably well adapted for high speeds.

Page Belting.—The use of belts is comparatively little understood, although the belt is certainly one of the oldest mechanical devices for transmitting power. Few persons even among those who are constantly using them can tell what are the qest belts to use for a given location and work, and thus they frequently buy belts that are entirely out of place, though probably costing much more than the one that would be most thoroughly suited to the purpose. The Page Belting Company, of Concord, N. H., have made a thorough study of this special field. They have published in pamphlet form some admirable and well-digested ideas on the subject of what to use and how to use it; and they will send a copy, free, of this pamphlet to all who may desire to have one.

STOCK QUOTATIONS.

The following list, compiled by Mr. W. H. Baker, member New York Stock Exchange, 16 and 18 Broad street, gives the current quotations of electrical stocks:

July 26, 1887.

TELEGRAPH.	Bid.	Asked.
Am. Dist.	25	35
Am. Tel. & Cable	73	74½
Cen. & So. Am.	95	110
*Com. Tel	100	103
*Gold & Stock	.....	.....
*Inter. Ocean Tel.	.....	.....
N. Y. Mutual	75	80
Pac. & Atl.	45	55
*Postal T. & C.	25	35
South. & Atl.	65	78
W. U. Tel.	75⅛	75¼
W. U. Scrip	73	.....
W. U. Bonds	116½	.....
Mut. U. Bonds	85	86
TELEPHONE.		
Am. Bell	218	220
Am. Speaking	110	120
Erie	32¾	33
*Hudson River	.....	60

TELEPHONE.	Bid.	Asked.
Mexican	.....	1½
*N. Y. & N. J.	86	92
N. Y. & Pa.	.....	.....
New England	43	45
*Southern Bell	125	135
ELECTRIC LIGHT.		
*Am. Electric	.....	.....
*Brush	.....	.....
*Brush Ill.	.....	.....
*Consolidated	.....	.....
*Daft	.....	.....
*Edison	200	220
*Edison Ill	.....	.....
*Edison Isolated	95	102
*United States	.....	.....
*U. S. Ill.	.....	.....
MOTOR.		
*Daft	.....	.....
*Sprague	.....	.....

* These stocks are so seldom dealt in that it is difficult to give prices at which they can be bought or sold. The figures given are as near as can be ascertained.

OUR ILLUSTRATED RECORD OF ELECTRICAL PATENTS.

PATENTS DATED JULY 12, 1887.

366,195. Underground Way or Conduit; S. W. Arnold and W. C. Cranmer, of Phila., Pa. Application filed March 7, 1887. Corrugated plates are placed back to back, so that when a series are placed together, a cross-section has the appearance of honey-comb. See illustration.

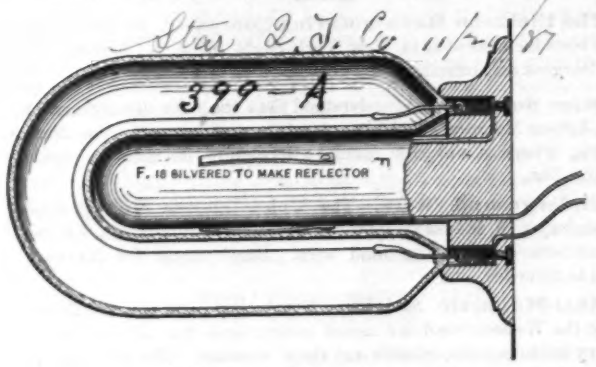
366,202. Apparatus for Measuring Electricity; J. Canderay, of Paris, France. Application filed July 3, 1886. This meter is built on the same principle as that described in THE ELECTRICAL WORLD of July 22, 1887, to same party.

366,209. Electrical Conductor for Railway Trains; A. L. Duwelius, of Cincinnati, Ohio. Application filed Jan. 13, 1887. The truss-rods of the cars are made the electrical conductors, and the conductor is made continuous by connecting the ends of said rods with short conductors.

366,212. Electrical Alarm; J. A. Galvin, of Steelton, Pa. Application filed Feb. 19, 1887. This is a burglar alarm in which an electric lamp is lighted or put out, as the case may be, by the disturbance of an electric circuit.

366,229. Telegraphy; L. Maiche, of Paris, France. Application filed Oct. 15, 1886. Improvements in the transmitting and receiving instruments.

(1) 366,367. Automatic Regulator for Electric Motors; (2) 366,268. Electric Meter; W. Stanley, Jr., of Great Barrington, Mass., Assignor to Geo. Westinghouse, Jr., of Pittsburgh, Pa. Application filed respectively Sept. 4, 1886, and Aug. 22, 1885. (1) A circuit controller is applied to the shaft of the motor, which consists of a series of pointed teeth or plates, to which there is applied a brush adjustable with reference to the teeth so as to make contact with either the wide or narrow portions thereof, according as it is desired to increase



306,352. SILVERED LAMP.

or decrease the speed of the motor. (2) Simple and efficient means for determining the number of coulombs conveyed, *i. e.*, the total of the ampère hours delivered.

366,289. Conductor Support; W. P. Zimmerman, of Freeport, Ill. Application filed March 28, 1887. The support consists of a single piece of wire bent around the conductor and fastended at both ends.

366,292. Car-Lighting Apparatus; C. R. Arnold, of Sharon Hill, Pa. Application filed March 29, 1886. Dynamo and engine are located at one end of car. The object is to secure a steady light and to prevent the usual noise and jar from running dynamos.

366,305. Galvanometer; H. B. Cox, of Cincinnati, Ohio. Application filed Sept. 28, 1886. The object is to provide an apparatus embodying all the usual elements but adapted to fold up into a small space for portability.

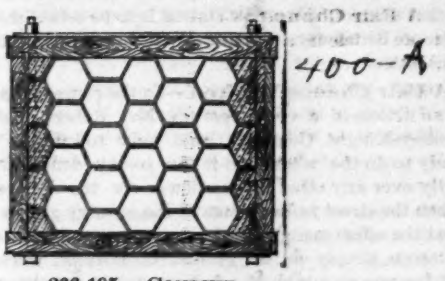
366,319. Pneumatic Telephone; J. P. Hurley and G. F. Perkins, of Holyoke, Mass. Application filed Sept. 8, 1886. A peculiar construction and arrangement of the speech-transmitting and receiving devices, and of signaling devices connected therewith. See illustration.

366,324. Automatic Electric Temperature Regulator; W. S. Johnson, of Milwaukee, Wis. Application filed April 5, 1887. Structural details relating to the operation of valves and dampers operated by a fluid under pressure, which is controlled by a current of electricity.

366,347. Electrical Converter; A. Schmid, Allegheny, Pa., Assignor to George Westinghouse, Jr., of same place. Application filed Dec. 27, 1886. A converter, having its core formed of thin plates, each plate surrounding both sides of the coils.

(1) 366,349. Regulator for Self-Exciting Alternate Current Electric Generators; (2) 366,350. Safety Strip for Electric Circuits; O. B. Shallenberger, of Rochester, Assignor to George Westinghouse, Jr., of Pittsburgh, Pa. Applications filed respectively Dec. 2, 1886, and Jan. 17, 1887. (1) The field of force is maintained by deriving alternating or secondary currents from the primary current and causing the same to be converted into a continuous current which is caused to traverse the coils of the field. (2) Convenient means devoid of danger are provided for replacing fusible plugs or strips.

(1) 366,352. Incandescent Electric Lamp; (2) 366,353. Process of Making Incandescents; E. P. Thompson of Elizabeth, N. J. Applications filed Sept. 15, 1886. (1) A reflecting globe is inserted in another globe and



366,195. CONDUIT.

occupies the space within the arms of the filament. A fixture is provided with a projection fitting within the tube. See illustration. (2) The filament, in an electric circuit, is placed in a tight jar and subjected to hydrocarbon vapors under pressure while the current of electricity is traversing the filament.

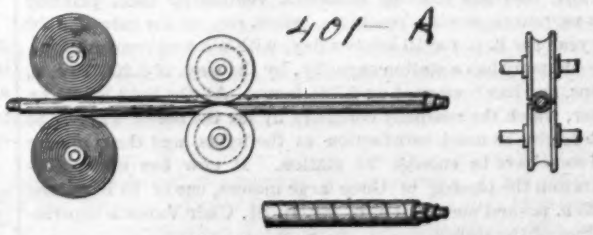
366,361. Electric Conductors; G. Westinghouse, Jr., of Pittsburgh, Pa. Application filed Nov. 23, 1886. A central conductor is covered with insulation and this is covered by a second conductor in two parts, then the whole is covered with insulating material. See illustration.

(1) 366,362. (2) 366,544. Electrical Converters; George Westinghouse, Jr., Pittsburgh, Pa. Application filed Dec. 27, 1886. The object of (1) is to provide a converter which will run a long time without becoming overheated, and of (2) to construct a converter which shall be moisture proof.

366,374. Circuit Controller for Electric Circuits; H. M. Byllesby and P. Lange, Pittsburgh, Pa., Assignor to Geo. Westinghouse, Jr., of same place. Application filed Dec. 7, 1886. This device is to provide convenient means for placing a certain portion of the whole number of lamps or other translating devices upon one side or the other of a system.

366,375. Electric Converter; H. M. Byllesby, of Pittsburgh, Pa., Assignor to Geo. Westinghouse, Jr., of same place. Application filed Jan. 10, 1887. Thorough insulation of the coils from one another is the object of this invention.

366,376. System or Circuit for Electrical Distribution; Henry M. Byllesby, of Pittsburgh, Pa., and O. B. Shallenberger, of Rochester, Assignors to George Westinghouse, Jr.,



366,361. CONDUCTOR.

of Pittsburgh, Pa. Application filed March 3, 1887. The primaries are strung along the upper cross arms of the poles and the secondaries along the lower cross-arms. Converters are mounted at suitable distances, and the proper connections are made from them. The feeders are led off from secondaries at desired points.

366,400. Telegraph Key; A. S. Keating, of Corry, Pa. Application filed Aug. 6, 1886. It is designed to provide means whereby open circuit batteries may be used successfully on a single line wire.

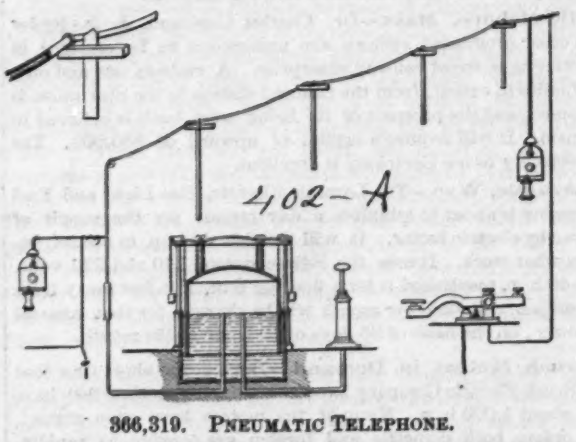
(1) 366,407. Electric Switch; (2) 366,408. Core for Electro-Magnets and Method of Forming the same; (3) 366,409. Electric Galvanometer; P. Lange, of Pittsburgh, Pa., Assignor to George Westinghouse, Jr., of same place. Applications filed respectively Dec. 2, Dec. 2, 1886, and Feb. 4, 1887. (1) A switch in which the connections may be made and broken very abruptly. (2) A cylinder of paper is sized on the outside and then wound with a coil of wire. The cylinder is then slit and flattened, then wound into a tight convolute. (3) The object is to secure as great amplitude of movement of the indicating device as possible.

366,410. Electric Galvanometer; P. Lange, of Pittsburgh, and O. B. Shallenberger, of Rochester, Assignors to George Westinghouse, Jr., of Pittsburgh, Pa. Application filed Dec. 16, 1886. Structural details.

366,457. Laying Continuous Electrical Conduits; A. C. Chenoweth, of New York, N. Y. Application filed Nov. 16, 1886. Plastic material is built around between a core and a casing, after which both are removed.

366,513. Electric Controlling and Regulating Device for Pendulums; W. S. Scales, of Somerville, Mass., Assignor to the Synchronous Time Company. Application filed Sept. 2, 1886. A pivoted bar carrying a pivoted push point, which latter co-operates with a regulating point secured to a rotating shaft, as, for instance, to the minute hand arbor of a clock.

366,523. Automatic Regulator for Eectric Distribution; W. Stanley, Jr., of Great Barrington, Mass., Assignor to Geo. Westinghouse, Jr., Pittsburgh, Pa. Application filed Nov. 14, 1885. An apparatus wherein a current of variable strength is caused to traverse the primary coil of the converter and is automatically regulated through the instrumentality of the counter electromotive force developed within the converter



366,319. PNEUMATIC TELEPHONE.

itself, the variations of which force are caused by and dependent upon the variations of resistance in the secondary circuit.

366,606. Key Socket for Incandescent Electric Lights; F. L. Pope, of Elmora, N. J.; H. M. Byllesley and P. Lange, of Pittsburgh, Pa., Assignors to George Westinghouse, Jr., of Pittsburgh, Pa. The object is a simple and efficient socket which is cheap and not liable to get out of order.

(1) 366,613. (2) 366,614. Electric Arc Lamp; A. G. Waterhouse, of Hartford, Conn., Assignor to the Waterhouse Electric and Manufacturing Co., of same place. Applications filed respectively May 5 and Sept. 13, 1886. (1) New arrangement of cut-outs and other details. (2) Details in the construction of the feeding mechanism.

366,628. Type Wheel for Printing Telegraph Receiver; C. L. Healy, of Brooklyn, Assignor to the Commercial Telegram, of New York, N. Y. Application filed March 19, 1886. New arrangement of type on two wheel "printers" for stock quotations.

366,634. Electric Switch; R. Macrae and C. F. Tavener, R. Macrae, of Baltimore, Md., and C. F. Tavener, of Boston, Mass., Assignors of one-third to Peter Deveney, of Boston, Mass. Application filed Oct. 27, 1886. A sudden changing of the contact plates to avoid sparking is the object of the invention.

Copies of the specifications and drawings complete of any of the patents mentioned in this record—or of any other patent issued since 1866—can be had from this office for 25 cents. Give the date and number of patent desired, and address Johnston's Patent Agency, Potter Building, New York.